
CITY OF RICHMOND URBAN GREENING MASTER PLAN



The work was made possible by a grant from the
California Strategic Growth Council

Prepared for

**THE CITY OF RICHMOND
PLANNING DEPARTMENT**

Prepared by

**VALLIER DESIGN ASSOCIATES, INC.
MACNAIR & ASSOCIATES
LSA ASSOCIATES, INC.**

MARCH 2017

CITY OF RICHMOND URBAN GREENING MASTER PLAN

Prepared for

The City of Richmond

Planning Department
450 Civic Center Plaza
Richmond, CA 94804

Prepared by

Vallier Design Associates, Inc.

210 Washington Avenue, Suite G
Richmond, CA 94801

MacNair & Associates

P. O. Box 1150
Glen Ellen, CA 95442

LSA Associates, Inc.

157 Park Place
Richmond, CA 94801

In association with

Groundwork Richmond

249 Tewksbury Avenue
Richmond, CA 94801

MARCH 2017

THIS PAGE INTENTIONALLY LEFT BLANK

LETTER FROM CITY MANAGER BILL LINDSAY

As City Manager and on behalf of the City of Richmond, I am proud to present Richmond's Urban Greening Master Plan. Our urban forest represents all of the trees and vegetation found within our commercial and residential areas, along our streets, and in our parks. This great forest is one of the city's most important assets, with benefits ranging from reducing air pollution, managing stormwater, providing natural habitat for birds and other wildlife to enhancing our quality of life. Our urban forest will prove increasingly valuable in the face of climate change. Expanding and maintaining the forest can help us both mitigate climate change, by absorbing carbon dioxide, and adapt to it, by helping to cool the city.

Richmond's Urban Greening Master Plan continues and strengthens our city's commitment to its natural environment. The plan outlines five central goals for our work:

- » Protect the urban forest
- » Expand the urban forest
- » Manage and support the urban forest
- » Educate and promote stewardship of the urban forest
- » Fund the urban forest and urban greening initiatives

I hope you will join me in our efforts to protect and expand our urban forest for future generations.

Sincerely,

Bill Lindsay, City Manager
Richmond, California

THIS PAGE INTENTIONALLY LEFT BLANK

EXECUTIVE SUMMARY

The City of Richmond Urban Greening Master Plan (Plan) supports cleaner, healthier, safer, and more aesthetically pleasing neighborhoods by encouraging green streetscapes and promoting the City's efforts to maintain and enhance its urban forest. A robust and expanding urban forest provides residents, local businesses, and visitors with significant environmental service benefits and encourages walkable connections within the City of Richmond (City). The Urban Greening Master Plan was crafted to correspond with other significant planning efforts undertaken by the City, including the 2030 Richmond General Plan, the Bicycle Master Plan, Pedestrian Plan, Parks Master Plan, and Livable Corridors Form-Based Code to name a few.

The cornerstone of the Urban Greening Master Plan project was a detailed update of the inventory of trees on public land. A field survey documented the type, condition, location, and site conditions of all city-owned trees. As a result of the inventory, it was determined that Richmond has approximately 22,000 street trees and 13,000 potential tree planting sites within the public right-of-way. The information developed through the tree inventory and historic maintenance records were organized into a searchable database. This created a useful management tool for the City's Parks and Landscaping Division. Location points generated by the city-owned tree inventory were incorporated into a map compatible with the Geographic Information Systems (GIS) database maintained by the City. The inventory database was structured for analysis by means of i-Tree, a software suite created by the US Department of Agriculture.

Education about the value of urban greening and outreach to the community was an important and integral part in the development of the Urban Greening Master Plan project. As a part of the work, demonstrations and presentations were made during Arbor Day events and for neighborhood groups. A well-received and innovative component of the public outreach effort was a youth produced video on the benefits of urban trees entitled '**Greening Richmond Together**'. The video can be seen on YouTube by searching 'Urban Greening in Richmond.'

The Urban Greening Master Plan includes five urban greening goals and recommendations for achievement of these goals. These include strategies for maintaining and expanding the urban forest, updating the City's tree ordinance and city-owned tree policies, and reappointment of the Urban Forest Advisory Committee. The recommendations of the Plan are supported by a benefit-cost model that documented that the value of the environmental services provided by the City's urban forest outweighed the cost of planting and maintaining the forest. The plan also includes a specific list of current and planned urban greening projects that were used as the basis for the preparation of the initial study/mitigated negative declaration (ISMND) for project compliance with the California Environmental Quality Act (CEQA).

The Urban Greening Master Plan provides a road map for a strategic approach to preservation, management and expansion of Richmond's urban forest. It allows for quantification and analysis of urban forest data while building on and supporting planning efforts that promote the City's broader sustainability goals.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

EXECUTIVE SUMMARY	7
INTRODUCTION	11
1.01 Background	11
1.02 Purpose and Scope	12
1.03 Master Plan Components	13
1.04 Plan Development Process	14
1.05 Vision Framework	15
THE CASE FOR URBAN GREENING	23
2.01 Defining Urban Greening	23
2.02 Benefits of Urban Greening	24
EXISTING FRAMEWORKS	29
3.01 Previous and Current Planning Efforts	29
3.02 City Tree Inventory	35
3.03 Analysis by Zone	36
3.04 Existing Conditions and Challenges	50
3.05 Quantifying the Benefits of Richmond's Urban Forest	56
VISION & GOALS	63
4.01 Over Arching Goals	63
4.02 Supporting Policies and Programs	67
IMPLEMENTATION	87
5.01 Urban Greening Implementation Projects	87
5.02 Elements of Green Infrastructure & Sustainable Design	98
5.03 Funding Sources	103
5.04 Featured Projects	106
5.05 Conclusion	109
APPENDICES	111
A. Approved Street Tree List	111
B. Tree Planting Best Practices and Existing City Documents	137



CHAPTER 1

INTRODUCTION

1.01 BACKGROUND

In 2011, the City of Richmond (City) applied for and was awarded a Proposition 84 Grant to develop an Urban Greening Master Plan. Proposition 84, also known as the *Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006*, authorized funding to be used to “[revitalize] our communities and [make] them more sustainable and livable by investing in sound land use planning, local parks, and urban greening.”¹ The development and implementation of urban greening plans is a means to coordinate and support state-wide environmental goals while providing substantial benefits to local Richmond residents and community members.

WHY NOW?

The Urban Greening Master Plan will guide other planning efforts to improve Richmond’s physical landscape by identifying opportunities for policy making, programs, and partnerships to grow, maintain, and fund the urban forest through promoting community stewardship. This Plan incorporates the most relevant aspects of these plans, assessments, and ordinances into a document that will enable the City to realize its vision of a more walkable, multi-modal landscape that can offer many of the environmental, economic, and health benefits identified in Chapter 2.

The adoption of a ‘Health in All Policies’ ordinance and strategy in 2014 formalized the City’s recognition that one’s physical and social environments, along with local government decisions and the actions that shape these environments, have an impact on health outcomes².

OPPOSITE

Aerial View of the City of Richmond, California 2007

Image Source:
U.S. Army Corps of Engineers

1 California Penal Code, Division 43, Chapter 1, Section 75003(e). Accessed 4/10/16. http://www.waterboards.ca.gov/water_issues/programs/grants_loans/prop84/docs/prop84nov2006.pdf

2 Richmond Municipal Code, Chapter 9.15 – Health in All Policies.

In addition to identifying the myriad benefits of the urban forest, the Urban Greening Master plan guides the City in ensuring that these benefits are shared and assets are distributed equitably to help reduce health disparities among Richmond residents.

The Bay Area's susceptibility to drought conditions can present challenges to expanding and maintaining Richmond's urban forest. At times, water conservation and proper maintenance of the urban forest may present conflicting goals. Expansion of the urban forest must therefore occur in a water-conscious manner, through careful selection of drought-tolerant plant species, consideration of water collection and conservation techniques, and the use of green infrastructure to manage and treat stormwater runoff. The Urban Greening Master Plan identifies strategies for expanding the urban forest in a manner that will also allow residents and the City to meet water conservation goals. Recommendation Policy 2-D, which entails establishing 'development best practices' to expand the urban forest through sustainable design, provides a number of sustainable development guidelines for the City's consideration.

1.02 PURPOSE AND SCOPE

The Richmond Urban Greening Master Plan supports cleaner, healthier, safer, and more aesthetically pleasing neighborhoods by encouraging green streetscapes and expansion of the City's urban forest. The urban forest extends beyond the City's trees to include the entire complex system of smaller plants, wildlife, associated organisms, soil, water and air in and around the City. A robust and expanded urban forest provides residents, local businesses, and visitors with ecosystem services, significant economic and environmental benefits, and encourages walkable connections within the City of Richmond.



The Urban Greening Master Plan will become the City's guiding policy document for implementing the vision of a vibrant urban forest that generates the environmental, economic and social benefits of urban greening. Richmond is experiencing a period of growth oriented towards rebalancing the City's distribution of structures, hardscapes and green areas. The Urban Greening Master Plan will support the integration of the urban forest into an existing urban environment dominated by hardscapes and impervious surfaces through urban greening efforts. The need for urban greening is established in recently adopted City-wide planning and regional initiatives, including the 2030 General

Plan, the Bicycle Master Plan, the Pedestrian Plan, Parks Master Plan, Climate Action Plan, Zoning Ordinance update, the Livable Corridors Form-Based Code and the Municipal Regional Permit. The Urban Greening Master Plan is intended to further the success of these plans and ultimately yield a greener, healthier Richmond through engaging community groups and fostering stewardship of the urban forest.

While Richmond's urban forest encompasses more than the City's publicly-owned trees, a cornerstone of the Urban Greening Master Plan project was a detailed update of the City's publicly-owned tree

ABOVE

Volunteer Tree Planters

Image Source:

'Greening Richmond Together' Video

inventory. A 2012 field survey documented the type, condition, location, and site conditions of all city-owned trees. According to the inventory, the City of Richmond owns approximately 22,000 street trees and contains approximately 13,000 potential tree planting sites within the public right-of-way. The information developed through the tree inventory was organized into a searchable database, along with historic maintenance records, to create a useful management tool for the Parks and Landscaping Division. Location points generated by the city-owned tree inventory were incorporated into a map compatible with the Geographic Information Systems (GIS) database maintained by the City. The inventory database was structured for analysis by means of i-Tree, a software suite created by the United States Department of Agriculture. This spatial inventory also provides for an analysis of the relative tree canopy coverage between areas within Richmond, allowing the City to target future greening efforts in neighborhoods with disproportionately low tree canopy coverage. In this way, the City can work towards ensuring that the benefits of the urban forest are distributed equitably among all Richmond residents.

The tree inventory reflects the results of data collected in 2012 and 2013 to establish an initial survey of baseline conditions upon which future progress can be assessed. This database is actively updated as trees in the City are planted or removed.

1.03 MASTER PLAN COMPONENTS

The Urban Greening Master Plan is the culmination of six years of research and action to understand and support Richmond's urban forest. The Plan documents the state of Richmond's urban forest, identifies connections between the urban greening elements of recent and current planning efforts, as well as greening initiatives undertaken by community groups, and provides a road map for expanding and integrating the urban forest into the urban landscape to ensure that the benefits of the urban forest are distributed equitably among Richmond residents.

The development of the Urban Greening Master Plan included a number of sub-tasks, including:

- » Preparation of an updated and comprehensive tree inventory
- » Preparation of a comprehensive tree inventory based on Phase I preliminary inventory and new field-collected data
- » Development of a Technical Advisory Group/Project Advisory Group
- » Development of a group of community residents to be trained and compensated to participate in some capacity in the tree inventory component of the Urban Greening Master Plan
- » Reactivation of the Urban Forest Advisory Committee
- » Development of an Urban Greening Master Plan document
- » Documentation of the health impacts of Urban Greening Strategies

1.04 PLAN DEVELOPMENT PROCESS

Education and community engagement were important components of the development of the Urban Greening Master Plan. The formation of the Project Advisory Group (PAG) at the Plan's outset allowed interested and knowledgeable community members to provide feedback throughout its development. Community-based organizations and citizen action groups focused on trees and urban greening in Richmond present an invaluable source of knowledge and stewardship in the community. Wider Urban Greening Master Plan outreach efforts in the community included demonstrations and presentations on Arbor Day for neighborhood groups, participation at neighborhood council meetings, and the hosting of a community kick-off event. A well-received and innovative component of the public outreach effort was a youth-oriented video entitled *Greening Richmond Together*. The video was posted on YouTube and promoted by community groups.

BELOW:

Arbor Day tree planting and greening event in Richmond.



Public education is critical to developing stewardship of the urban forest. The development of the Urban Greening Master Plan was a community-supported endeavor that sought to integrate feedback from community members, committee and commission members, as well as City staff. Community engagement for the Urban Greening Master Plan took a number of forms, each of which is described in this section.

PROJECT ADVISORY GROUP, TECHNICAL ADVISORY GROUP, AND THE URBAN FOREST ADVISORY COMMITTEE

The Project Advisory Group (PAG) included representatives of stakeholder groups and stewards of the urban forest who provided guidance, feedback, and information sharing to maximize public input and participation in the creation of the Urban Greening Master Plan.

Many members serving on the Project Advisory Group and/or Technical Advisory Group are now appointed members of the Urban Forest Advisory Committee (UFAC). The UFAC was reappointed on November 17, 2015 to advise and assist the City Council in creating a healthy urban forest. A draft Urban Greening Master Plan was presented to the UFAC on April 18, 2016 and again in standing meetings through August 2016 to solicit feedback from committee members. The UFAC will support implementation of tree-related portions of the UGMP.

COMMUNITY KICK-OFF EVENT, PRESENTATIONS AND DEMONSTRATIONS

In March 2012, the City's Planning and Parks and Landscaping Divisions hosted the Urban Greening Master Plan Project Kick-off at the Richmond Recreation Complex Social Hall. Participants learned about urban greening and its benefits. There was also a planting demonstration and an opportunity to participate in the first phase of the urban forest inventory process.

ENGAGEMENT OF NEIGHBORHOOD COUNCILS

In May 2012, Vallier Design Associates, Inc. spoke at the Richmond Neighborhood Coordinating Council and the Marina Bay Neighborhood Council meetings to update community members on the progress of the Urban Greening Master Plan and to provide information about how to be included in the greening process.

'GREENING RICHMOND TOGETHER' VIDEO

The video was a well-received and innovative outreach effort undertaken as a part of the work that generated the Urban Greening Master Plan. Catered to a youth audience, this 11.5-minute video was produced in partnership with Groundwork Richmond, a local nonprofit organization whose mission is the creation of better, safer, and healthier neighborhoods through community-based partnerships. The video premiered at a local theater and distributed to local schools for use in educational programs.



URBAN GREENING MASTER PLAN WEBSITE

A webpage hosted on the City's website has been maintained and updated since the Urban Greening Master Plan's inception. The webpage includes an overview of the project, details about the Citywide Tree Inventory, links to relevant resources and community groups, and materials from all community meeting and outreach events. The website serves as a publicly-accessible platform through which residents and community members can remain informed about the progress of the Urban Greening Master Plan.

1.05 VISION FRAMEWORK

The Urban Greening Master Plan provides a road map for a strategic approach to protection, expansion and management of Richmond's urban forest and permeable streetscapes while supporting the goals of other City plans for a greener and healthier Richmond.

The Urban Greening Master Plan is structured around five core goals, each of which has an instrumental role in the health of Richmond's urban forest.

- » **GOAL 1: PROTECT THE URBAN FOREST**
- » **GOAL 2: EXPAND THE URBAN FOREST THROUGH URBAN GREENING INITIATIVES**
- » **GOAL 3: MANAGE AND SUPPORT THE URBAN FOREST AND URBAN GREENING**
- » **GOAL 4: EDUCATE AND PROMOTE STEWARDSHIP OF THE URBAN FOREST**
- » **GOAL 5: FUND THE URBAN FOREST AND URBAN GREENING INITIATIVES**

ABOVE

The opening screen of the 'Greening Richmond Together' video.

RECOMMENDATIONS

In correspondence with the five core goals, the Plan puts forth a number of recommended actions for the City to achieve its urban greening goals. Tables of recommended actions associated with each goal are provided in Section 4.02 of this document. Lead City departments and an anticipated time frame also accompany each recommended action. The Lead City Departments will be assisted by the Urban Forest Advisory Committee (UFAC), an appointed group of citizens that help advise the City on urban forestry. Strategies include the creation of programs to incentivize maintenance and expansion of the urban forest in a drought-sensitive manner, strengthening the City’s development policies to better protect trees, and continuing to support community groups in their tree planting and maintenance efforts. The recommendations of the Plan are supported by a benefit-cost analysis (Section 3.03) that quantifies the value of the environmental services provided by the City’s urban forest. This analysis reveals that the benefits of the urban forest outweigh the cost of its expansion and maintenance. The plan also includes a list of specific current and planned urban greening projects that were used as the basis for the preparation of an initial study/mitigated negative declaration (ISMND) for project compliance with the California Environmental Quality Act (CEQA).

IMPLEMENTATION

Successful expansion of the urban forest depends upon the support of the Richmond community along with City resources. The City’s annual budget does not have the capacity to fund all of the actions identified in this plan; therefore, it is essential that efforts to expand Richmond’s urban forest are in partnership with community groups and property owners. State initiatives such as the California Global Warming Solutions Act of 2006 (Assembly Bill 32), Sustainable Communities and Climate Protection Act of 2008 (Senate Bill 375) and Greenhouse Reduction Fund of 2012 (Senate Bill 535) provide significant opportunities for outside funding to be acquired to assist in the achievement of Richmond’s urban greening goals. Equally important will be the Transformative Climate Communities Program (Assembly Bill 2722) currently amended in legislation

GOAL 1: PROTECT THE URBAN FOREST - RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department Supporting Departments in <i>Italics</i>	Timeframe
Policy 1-A	<p>Strengthen the City’s existing tree ordinances to achieve a net zero loss of trees and consider adding a section to recognize and protect significant trees.</p> <p>Section 15.04.510 of the Richmond Municipal Code, Resource Management Overlay District, establishes Planning Commission findings, tree preservation and development design criteria, methods of preserving trees during construction, criteria for tree removal, and tree replacement standards for development in the Hillside Physical Constraint Area. To extend similar protections and standards for all public and private Richmond trees, similar language could be included in the City’s, Trimming, Pruning, Care, Planting, Removal and Moving of Trees, Shrubs or Plants Ordinance (R.M.C. 10.08). The City will research effective methods of encouraging and enforcing proper tree care and maintenance standards for all trees in the City.</p>	<p>Planning Division <i>City Attorney’s Office</i></p>	Short-term
Policy 1-B	<p>Recognize and establish biological and natural resource protection areas as part of the City’s urban forest.</p> <p>Establish biological and natural resource protection areas within or in close proximity to the City of Richmond and consider adopting open space requirements and/or a biological and natural resource habitat overlay district in the City’s Zoning Ordinance to provide greater protection from future development pressures.</p>	<p>Planning Division <i>Parks and Landscaping Division</i> <i>East Bay Regional Parks District</i> <i>California Department of Fish and Wildlife</i> <i>San Francisco Bay Regional Water Quality Control Board</i> <i>Bay Conservation and Development Commission</i> <i>US Army Corps of Engineers</i></p>	Mid-term

GOAL 2: EXPAND THE URBAN FOREST - RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department Supporting Departments in <i>Italics</i>	Timeframe
Program 2-A	<p>Activate a City-wide tree planting program on opportunity sites by supporting and expanding existing tree programs and events.</p> <p>The City of Richmond currently owns and maintains approximately 22,000 trees on city-owned property and within the public right of way. The 13,000+ opportunity sites identified in the Urban Greening Master Plan present the potential to increase the City's public tree inventory by more than fifty percent. The City will continue to partner with community groups and the Urban Forest Advisory Committee to support a City-wide tree planting program to pursue new planting following industry best practices.</p>	<p>City Manager's Office – Environmental Initiatives <i>Parks and Landscaping Division</i> <i>Public Works Department</i> <i>Urban Forestry Advisory Committee</i> <i>Richmond Police Department</i></p>	Short-term/Ongoing
Program 2-B	<p>Support urban greening initiatives by citizen action groups while following adopted industry best practices.</p> <p>Community-based organizations and citizen action groups have a long legacy of undertaking tree planting campaigns in Richmond and present an important source of physical and outreach capacity for labor-intensive planting and maintenance tasks. The City will assist in leading and overseeing the activities of these groups to coordinate efforts, review and approve landscaping plans following established industry best practices, and support greening events. The City will continue to support and help build community organization capacity by providing access to meeting spaces, collaborating on shared grant opportunities and other sources of funds, and remain receptive to community group ideas and proposals for new projects.</p>	<p>City Manager's Office – Environmental Initiatives Parks and Landscaping Division <i>Planning Division</i> <i>Mayor's Office</i></p>	Mid-term
Policy 2-C	<p>Follow plant species recommendations and biodiversity requirements for new planting projects, adopt the updated Approved Street Tree List, and routinely update recommendations to encourage plant selections that are suited to Richmond's environmental conditions.</p> <p>Following adoption of the Urban Greening Master Plan, development of a Phase II Urban Forest Management Plan will be necessary to support the City's greening goals by specifying planting methods and formalizing industry best practices for landscape planting and maintenance, consistent with development standards in the City's municipal code. The Urban Forest Management Plan could establish drought-tolerant plant species recommendations and plant biodiversity requirements for new development to (a) prioritize the use of disease-resistant native species in new plantings, (b) use appropriate tree species and densities in buffer areas, (c) ensure that medians include native and/or suitable plants and trees and are wide enough to support their long-term viability with the least demand for irrigation and maintenance, and (d) respect the 10-20-30 rule to create a resilient and diverse plant profile. The Approved Street Tree List will evolve as plant varieties are developed and exposed to pests, diseases and other pathogens.</p>	<p>Planning Division Parks and Landscaping Division <i>Public Works Department</i></p>	Long-term
Policy 2-D	<p>Consider the establishment of development best practices to expand the urban forest through sustainable design.</p> <p>Consider establishing a set of best practices for the design of new development projects and subdivisions to address environmental concerns such as stormwater runoff and pollution of natural resources, heat absorption and the urban heat island effect, all of which are factors that negatively impact the health of the City's urban forest. The process to develop these best practices could include:</p> <ul style="list-style-type: none"> » Model green design standards adopted by the state and federal government to encourage the use of green infrastructure in all new development projects. » Consider adopting shading requirements and heat mitigation measures for new infrastructure projects. » Consider adopting State and local agency water conservation and stormwater management guidelines to promote sustainable development. » Consider the establishment of clear performance standards for development near creeks and encourage the daylighting and restoration of creeks. 	<p>Planning Division <i>Engineering Services Department</i> <i>Public Works Department</i></p>	Mid-term

GOAL 2 RECOMMENDATIONS SUMMARY (CONT.)

Urban Greening Master Plan Policy or Program	Description	Lead Department Supporting Departments <i>in Italics</i>	Timeframe
Program 2-E	<p>Coordinate green strategies with other City-wide plans to achieve mutual goals.</p> <p>Integrate greening strategies identified in the UGMP with actions in other City plans such as the Climate Action Plan, Parks Master Plan, Bike and Pedestrian Plans. Many of the actions identified in the Urban Greening Master Plan will assist in achieving the goals of the Climate Action Plan, Parks Master Plan, and Bike and Pedestrian Plans.</p>	<p>Planning Division City Manager's Office – Environmental Initiatives Engineering Services Department</p>	Short-term/Ongoing
Program 2-F	<p>Support urban agriculture through inclusive land use policy.</p> <p>Agricultural land uses provide urban greening as well as commercial and employment opportunities. Explore the feasibility of establishing orchards and other forms of commercial crop production such as citrus, fruits and vineyards within the City.</p>	<p>Parks and Landscaping Division Planning Division Community-Based Organizations</p>	Mid-term/Ongoing
Policy 2-G	<p>Update the Park and Recreation Dedication and Fees Ordinance to require new development and redevelopment projects to pay a fair share of the costs of parkland acquisition and improvement.</p> <p>Perform a nexus study and update the required development impact fee schedule to ensure that funding is available for the development of new parklands. Consider establishing a replacement ratio for open space and parkland to ensure that there is no net loss of open space in the City due to new development projects.</p>	<p>Parks and Landscaping Division City Manager's Office Planning Division Public Works</p>	Mid-term
Policy 2-H	<p>Consider negotiating with private land owners and State agencies for the establishment of open space and planting area easements.</p> <p>To protect and expand Richmond's urban forest, consider negotiating open space easements with private land owners where there are opportunities to preserve natural resources and wildlife habitat, increase open space, and benefit from ecosystem services. Furthermore, consider working with State agencies such as CalTrans, who exercise authority over land within the City of Richmond, to incorporate urban greening efforts into infrastructure projects.</p> <p>Negotiating open space easements is one method of expanding and protecting the City's biological and resource protection areas (refer to Policy 1-B.)</p>	<p>Planning Division City Attorney's Office</p>	Ongoing

GOAL 3: MANAGE AND SUPPORT THE URBAN FOREST AND URBAN GREENING - RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department Supporting Departments in <i>Italics</i>	Timeframe
Program 3-A	<p>Partner with community groups for tree planting and maintenance. Formalize partnerships with community groups following the guidance of trained and approved arborists to coordinate the planting and maintenance of Richmond's trees. Community groups have played a critical role with tree planting and securing program funds; however, the City remains instrumental to the success of City-wide urban greening initiatives. The City will continue to provide support to community groups in their efforts.</p>	<p><i>Parks and Landscaping Division</i> <i>Community-Based Organizations</i></p>	Mid-term
Program 3-B	<p>Maintain and expand the urban forest inventory to reflect the diversity of urban greening projects in Richmond. The urban forest extends beyond the City's trees to include smaller plants, wildlife, organisms, soil, water and air, and the urban forest inventory should reflect this diversity. Therefore, a spatial inventory of urban greening must include green infrastructure projects, conservation areas, community gardens, parks and other green spaces to inform City staff and the community of the distribution of greening across the City and assist in the identification of priority greening areas.</p>	<p>Parks and Landscaping Division Community-Based Organizations</p>	Long-term/Ongoing
Policy 3-C	<p>Support the City's Integrated Pest Management ordinance to foster plant and wildlife diversity. Support the City's Integrated Pest Management (IPM) ordinance (R.M.C. 9.48) to foster plant and wildlife biodiversity through restricting the use of pesticides and requiring that the least-toxic pesticide be applied when necessary.</p>	<p>Landscaping and Parks Division Public Works Department Community-Based Organizations</p>	Short-term/Ongoing
Program 3-D	<p>Provide self-service stockpiles of compost and woodchips as a resource for urban greening projects. Consider providing stockpiles of greening inputs such as compost and woodchips at the City Corporation Yard for use by community groups and residents for urban greening projects in Richmond.</p>	<p>City Manager's Office – Environmental Initiatives Public Works Department Landscaping and Parks Division</p>	Mid-term/Ongoing
Program 3-E	<p>Practice and promote proper tree care techniques for publicly- and privately-owned trees. Practice and publicize proper tree care techniques for City-owned trees following industry standards. Partner with community groups to promote the use of these standards among homeowners and those who manage privately owned trees. Make proper tree care and maintenance techniques easily accessible through the Parks and Landscaping Division website for public access.</p>	<p>Parks and Landscaping Division Community-Based Organizations</p>	Short-term
Program 3-F	<p>Support and encourage use of the City's tool lending library. Support proper tree care by providing tree pruning and other maintenance tools at the City's tool lending library.</p>	<p>City Manager's Office <i>Parks and Landscaping Division</i></p>	Short-term/Ongoing
Program 3-G	<p>Support community participation in water conservation programs. Partner with utility companies that have shared water conservation goals to encourage Richmond resident participation in lawn transformation programs such as EBMUD's lawn conversion and irrigation upgrade rebates.</p>	<p>City Manager's Office – Environmental Initiatives Municipal Utility Companies</p>	Mid-term/Ongoing

GOAL 4: EDUCATE AND PROMOTE STEWARDSHIP OF THE URBAN FOREST - RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department Supporting Departments in <i>Italics</i>	Timeframe
Policy 4-A	<p>Explore opportunities to partner with the UFAC to support implementation of the Urban Greening Master Plan.</p> <p>The Urban Forest Advisory Committee (UFAC) was reappointed in 2015 to “advise and assist the City Council in creating a healthy urban forest, as well as promote and foster public awareness, education, volunteerism, and public-private partnerships to support urban forestry initiatives.” The City shall partner with the UFAC to support implementation of the Urban Greening Master Plan.</p>	<p>Mayor’s Office <i>Parks and Landscaping Division</i> <i>Planning Division</i></p>	<p>Short-term; The Urban Forest Advisory Committee was reappointed on November 17, 2015 by Resolution 110-15.</p>
Program 4-B	<p>Identify possible economic and workforce development opportunities associated with urban forestry.</p> <p>Explore and provide connections to economic and workforce development opportunities with street tree planting and maintenance through partnerships with programs modeled after RichmondBUILD or UC Cooperative Extension Master Gardener Program of Contra Costa County.</p>	<p>City Manager’s Office - Economic Development</p>	<p>Mid-term</p>
Program 4-C	<p>Support the development of environmental curricula to foster environmental stewardship.</p> <p>Support the development of curricula that relies on hands-on experiences in natural settings to foster environmental stewardship among young people and other interested parties.</p>	<p>City Manager’s Office - Environmental Initiatives Mayor’s Office <i>In partnership with University Extension programs</i> <i>Community-Based Organizations</i> <i>WCCUSD</i></p>	<p>Long-term/Ongoing</p>
Program 4-D	<p>Recognize significant trees and green infrastructure enhancements within Richmond.</p> <p>Give recognition to Richmond’s significant trees and green infrastructure enhancements by using the most recent tree database to create informational name tags or placards for trees and green infrastructure enhancements to educate the community about their significance.</p>	<p>Parks and Landscaping Division Engineering Services Department <i>City Manager’s Office - Environmental Initiatives</i> <i>Community-Based Organizations</i></p>	<p>Mid-term</p>
Program 4-E	<p>Consider assisting in the development of tree workshops for residents and community members.</p> <p>Consider assisting in the development of tree planting, care and maintenance workshops for residents and community members to inform individuals who may own and/or care for public and private trees of the adopted tree planting and maintenance standards used by the Parks and Landscaping Division. Partner with active and knowledgeable community-based organizations to offer and promote these events (refer to Program 3-E)</p>	<p>Parks and Landscaping Division</p>	<p>Short-term</p>

GOAL 5: FUND THE URBAN FOREST AND URBAN GREENING INITIATIVES - RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department Supporting Departments in <i>Italics</i>	Timeframe
Program 5-A	<p>Identify funding sources for urban greening projects and support of the City's Parks and Landscaping Division.</p> <p>The majority of recommended actions provided in the Urban Greening Master Plan will require fundraising efforts to see initiation and reach completion. As part of this Plan, several potential funding sources have been identified, however; as funding opportunities are constantly changing, it is essential that funding sources are updated and monitored. Many funding sources that are intended to achieve improvements such as promoting active transportation and providing affordable housing near transit to achieve greenhouse gas reductions can also include urban greening components.</p> <p>The Regional Water Quality Control Board's adoption of green infrastructure requirements for new or substantially rehabilitated street developments is an unfunded mandate, which presents budgetary challenges to future projects. In addition to continually identifying sources of funding for urban greening projects, the Planning Department, Engineering Services Department and City Manager's Office must communicate about specific funding opportunities for bioretention technology and other green infrastructure improvements to ensure that new streets and substantial improvement projects are able to adhere to green infrastructure requirements and receive funding through completion.</p>	Planning Division City Manager's Office – Environmental Initiatives Engineering Services Department	Short-term/Ongoing
Program 5-B	<p>Incorporate the costs of sustainable landscaping in capital improvement project budgets.</p> <p>Capital improvement projects revitalize the community by improving infrastructure surrounding community assets such as affordable housing, educational facilities, transportation hubs, and creating attractive spaces for community use. Successful capital improvement projects are the result of partnerships between the City, the school district, foundations, National Park Service, CBOs, non-profits, and residents. Capital improvement projects present an opportunity to fund urban greening projects that improve public spaces by providing the aesthetic, environmental, economic and social benefits of urban greening. Including the costs of green infrastructure required in new or substantially rehabilitated streetscapes in capital improvement budgets is especially important in realizing opportunities to mitigate downstream costs of water treatment due to pollution.</p>	City Manager's Office Engineering Services Department Planning Division	Mid-term
Program 5-C	<p>Maintain the City's Tree City USA designation.</p> <p>Continue to uphold the four standards required for the Tree City USA designation to better position Richmond to secure regional and national grants to support urban greening efforts.</p> <p>Tree City USA is a program of the Arbor Day Foundation that was established in 1976. The movement seeks to provide a framework through which cities can support and expand their population of publicly owned trees. Richmond first earned Tree City USA designation in 2009. To be considered for this designation, a city must achieve the following:</p> <ul style="list-style-type: none"> » Create and maintain a tree board or department (the recently appointed UFAC will serve as the qualifying tree board or department) » Create and uphold a tree care ordinance » Provide funding for a community forestry program » Observe and celebrate Arbor Day 	<i>Parks and Landscaping Division</i> <i>Mayor's Office</i> <i>City Manager's Office –</i> <i>Environmental Initiatives</i>	Ongoing



CHAPTER 2

THE CASE FOR URBAN GREENING

2.01 DEFINING URBAN GREENING

“Urban greening” encompasses a range of sustainable development practices related to the establishment and expansion of green streetscapes and open spaces to create cleaner, healthier, safer, and more aesthetically-pleasing neighborhoods. Sites for potential urban greening projects might include new and renovated streetscapes, greenways, conservation lands, schools, parks, urban farms and gardens, building rooftops and private yards.

The “urban forest” is a complex system of trees and smaller plants, wildlife, associated organisms, soil, water, and air in and around the City. Street trees, park trees, forested parklands, trees on institutional campuses, and trees on private property are all part of the urban forest. The urban forest includes the trees along the streets, the landscaping around our homes and institutions, the vegetation in commercial and industrial areas, the multilayered forests in our natural areas and the plants and landscaping in our parks.

Urban forests¹ provide cities with enormous aesthetic, environmental, social, and economic benefits, as discussed in Chapter 2 of this Plan. For example, urban forests can conserve natural ecosystems and wildlife habitat, induce traffic calming effects, thereby increasing public safety, and increase property values.²

OPPOSITE

Aerial View of the City of Richmond, California 2007

Image Source:
U.S. Army Corps of Engineers

1 The urban forest extends beyond the City's trees to include the entire complex system of smaller plants, wildlife, associated organisms, soil, water and air in and around the City.

2 U.S. Environmental Protection Agency. “Overview of Greenhouse Gases.” Last updated 2/24/16. Accessed 4/10/16. < <https://www3.epa.gov/climatechange/ghgemissions/gases/co2.html> >

2.02 BENEFITS OF URBAN GREENING

Urban forests are underestimated in the many ways they touch the lives of city dwellers. Urban forests can mitigate the impacts of industrialization and urban development by moderating the city's climate, conserving energy use, reducing pollution and storm water run-off, and enhancing the attractiveness of and health within the city. Green streetscapes, for example, make the City more attractive to new development, reduce negative environmental effects of storm water runoff to creeks and the San Francisco Bay, and enhance Richmond's retail, residential, industrial, and commercial centers. Green streetscapes also improve the quality of life of Richmond's residents promoting healthier lifestyles, and increasing the safety and attractiveness of alternative modes of transportation.

According to studies conducted across the country, the benefits of successful urban greening strategies far outweigh the costs. City officials and residents increasingly recognize that integrated urban greening plans are a key component in the overall vitality of a community. While urban greening methods implemented without foresight or planning can create maintenance problems, a well-managed, comprehensive and coordinated approach to urban greening can have positive impacts on the social, environmental, and economic viability of a community.

ENVIRONMENTAL BENEFITS

Urban forests have complex, yet quantifiable positive effects on environmental quality. Dense urban areas produce heat, carbon dioxide, and numerous airborne particulates—deleterious effects that can be reduced by a healthy and thriving urban forest.

BELOW

Urban Forests can promote use of alternative methods of transportation such as public transit, bicycling, and walking.

REDUCED AIR TEMPERATURES

As vegetation within an urban area is replaced by materials such as asphalt and concrete, surface temperatures rise. In addition, urban construction patterns create structures that block the convection-cooling capabilities of wind and inhibit night-time cooling. By intercepting solar radiation and re-radiation of heat from hardscape surfaces, forest canopies reduce both surface and ambient temperatures.



IMPROVED AIR QUALITY

Some airborne pollutants generated by human activity can be reduced by increasing urban forestation. In addition to mitigating smog generation by reducing ambient temperature, trees hold airborne particulate matter on leaf surfaces and can absorb carbon dioxide, carbon monoxide, nitrogen dioxide, and sulfur dioxide through photosynthesis. While storage of airborne particulate matter is short term and these pollutants may be washed off by rain or dropped to the ground with fallen leaves or twigs, the suspension of particulate matter on tree surfaces reduces the human health impacts—acute and chronic respiratory disorders, lung cancer, morbidity and mortality—associated with airborne particulate matter.

SEQUESTERED CARBON

While human production of greenhouse gases (GHGs) comprises just 3% of annual natural emissions, this production exceeds the balancing effect of natural GHG removal systems. Urban forests assist in the reduction of atmospheric carbon dioxide, one of the primary GHGs; in fact, carbon dioxide storage is often cited as one of the most important benefits of urban forests. In the contiguous United States alone, urban trees store over 708 million tons of carbon (approximately 12.6% of annual carbon dioxide emissions in the United States) and capture an additional 28.2 million tons of carbon (approximately 0.05% of annual emissions) per year.³

IMPROVED WATERSHED FUNCTIONS

Urbanization changes the condition and function of the watershed. According to data generated using i-Tree,⁴ the City of Richmond occupies approximately 22,500 acres of land, of which 7,880 acres, or approximately 38%, consists of impervious cover. The impervious surfaces absorb very little storm water compared to open land and produce large volumes of runoff into creeks from far less rainfall than a natural watershed. Urban trees can help control runoff from these impervious surfaces by catching rain in their canopies and increasing the infiltration rate of deposited precipitation. Reducing storm water flow reduces stress on urban storm water and of urban sewer systems by limiting the risk of hazardous sewer overflows.⁵

VALUE-ADDED MULTI-MODAL TRANSPORTATION

Urban greening is also beneficial for mobility. Landscape elements for urban greening are found to enhance safety by reducing injuries and crashes, allowing bicyclists a safer ride and are more pedestrian-friendly while also helping to slow traffic.⁶ Traffic-calming measures like chicanes, median islands, and curb extensions—used in creating Complete Streets—provide opportunities for bioswales, street trees, and rain gardens. Adding trees and landscaping to traffic medians enhances the public realm, improves aesthetics and safety and takes full advantage of ecological functions.

ECONOMIC BENEFITS

A healthy and comprehensive urban forest can increase property values and attract businesses. Urban forests are also becoming recognized as valuable 'utility' infrastructure systems—like storm water management, wastewater management, green streets and roads—which contribute to a City's financial standing.

PROPERTY VALUES

According to recent research, healthy, mature trees increase residential property values an average of 10%. Likewise, quality landscapes that include trees can result in higher commercial property rental rates. Studies show that consumers perceive business districts with large,

BELOW

Richmond Residential Property
On-site trees increase residential property values an average of 10%.



3 Safford, H.; Larry, E.; McPherson, E.G.; Nowak D.J., Westphal, L.M, 2013. Urban Forests and Climate Change. U.S. Department of Agriculture Forest Service Climate Change Resource Center. August. Available online at: <http://www.fs.fed.us/ccrc/topics/urban-forests/> (Accessed 8 January 2014).

4 i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban forestry analysis and benefits assessment tools.

5 Safford, H.; Larry, E.; McPherson, E.G.; Nowak D.J., Westphal, L.M, 2013.

6 Smart Growth America. Green Streets. <http://www.smartgrowthamerica.org/complete-streets/implementation/factsheets/green-streets/>

Table 2.1 Relationship between Street Trees and Increased Property Values

Tree Condition	Price increase*
Mature yard trees (greater than 9-inch diameter at breast height)	+ 2 %
Larger street trees	+ 3%
Trees in front yard landscaping	+ 3–5%
Good tree cover in a neighborhood	+ 6–9 %
Mature trees in high income neighborhoods	+ 10–15 %

Source: Wolf, K.L. 2010.

*Price effect is variable and depends on how tree presence is defined. In addition, the socioeconomic condition of a residential area also has an effect on pricing. For instance greater increments of value are seen for tree planting and landscape improvements in lower-quality neighborhoods.

healthy trees more positively and are willing to travel further, stay longer and pay 9-12% more for goods and services in these areas. Table 2.1 shows the results from a selection of studies on the relationship between street trees and increased property values.⁷

These values can be captured by local governments as increased property tax assessments or as excise taxes paid on property sales. For instance, a study in Portland, Oregon, found that street trees added \$8,870 to the sales price of a home. Applying that value to all houses in Portland would yield a total value increase of \$1.35 billion, potentially resulting in increased annual property tax revenues of \$15.3 million across the city.⁸ These revenues could be applied to a city’s the annual debt and to management costs of an urban forest program, further supporting home values.

COMPENSATORY VALUE

The urban forest has an inherent monetary value to the City, calculated as the purchase cost for replacing all of the trees, smaller plants, and wildlife

that together comprise the urban forest. While the average compensatory value per tree in the United States is \$630⁹, the value of a city’s urban forest trees will vary according to the species composition, size distribution, and condition of the forest. A recent evaluation of the compensatory value of the urban forest in Oakland, California indicated a compensatory urban forest value of \$757 million with \$477 per tree.¹⁰

COMMUNITY HEALTH AND WELLNESS BENEFITS

INCREASED RECREATIONAL OPPORTUNITY

The presence and character of green spaces in a neighborhood affects residents’ rates of recreational physical activity, which can improve both mental and physical health. Once sidewalks and trails are in place, the presence of nature influences perception of and motivation for physical activity. People make more walking trips to task destinations (such as stores or coffee shops) when they perceive that there are many natural features along the route.

Many studies connect urban park use to decreased stress levels and improved moods.¹¹ In one study, the longer participants stayed in a park, the less stress they exhibited.¹² More than 100 studies have shown that relaxation and stress reduction are significant benefits associated with spending time in green areas.¹³ Studies also show that childhood Attention Deficit Disorder symptoms can be reduced through activities in green settings and that “green time” may be an important supplement to established drug-based and behavioral treatments.

7 Wolf, K.L., 2010. Community Economics— A Literature Review. In: Green Cities: Good Health (www.greenhealth.washington.edu). College of the Environment, University of Washington.

8 Ibid.

9 Nowak, David J., Daniel E. Crane, and John F. Dwyer. “Compensatory Value of Urban Trees in the United States” Journal of Arboriculture 28(4) July 2002: 196. Available online at: http://www.nrs.fs.fed.us/pubs/jrnl/2002/ne_2002_nowak_003.pdf (Accessed 12 December 2013).

10 City of El Cerrito Urban Forest Management Plan, May 2007.

11 Wolf, K.L., and K. Flora 2010. Mental Health and Function - A Literature Review. In: Green Cities: Good Health (www.greenhealth.washington.edu). College of the Environment, University of Washington.

12 Ibid

13 Ibid

ENHANCED COMMUNITY COHESION

A neighborhood that incorporates easily accessible green spaces into its design may also improve social cohesion and interaction. This has the potential to foster community interactions that help build social capital and maintain residents' mental health by decreasing feelings of isolation and increasing self-esteem. Effective social support networks have been found to restore feelings of personal control and self-esteem by buffering the effects of stress and poor health which may result in depression.

Urban green spaces can provide a neutral space within which people come together, social interactions occur, and relationships or partnerships take form. Strong community relationships facilitate collaboration among community members to achieve common goals (e.g., cleaner and safer public spaces), to exchange information, and to maintain informal social controls (e.g., discouraging crime or other undesirable behaviors).

"...[an] urban forest improves air quality, improves quality of life, decreases asthma, reduces stress and isolation associated with violence..."

Contra Costa Health Services

Source: *Planning Communities: What Health Has to Do With It*, 2007

REDUCED CRIME

A recent study conducted in Portland, Oregon, investigated the effects of street trees and trees on residential lots.¹⁴ Researchers found that the incidence of trees in a public right-of-way were generally associated with a decrease in a wide range of crime (e.g., violent crime, property crime, burglary and vandalism). Trees on residential lots may also reduce crime by signaling to potential criminals that a house is better cared for and, therefore, subject to more effective policing by owners than a comparable house with fewer trees.

14 Wolf, K.L. 2010. Crime and Fear - A Literature Review. In: Green Cities: Good Health (www.greenhealth.washington.edu). College of the Environment, University of Washington.



CHAPTER 3

EXISTING FRAMEWORKS

3.01 PREVIOUS AND CURRENT PLANNING EFFORTS

In recent years, the City of Richmond has undertaken a number of significant planning efforts, including the update of its General Plan. Adopted on April 25, 2012, Richmond's *2030 General Plan* is an over arching policy document that establishes the City's development goals and visions for the next 20 years. The General Plan is detailed by other, more focused, planning documents, including the *Richmond Bicycle Master Plan*, the *Pedestrian Plan*, the *Parks Master Plan*, the *Livable Corridors Form-Based Code*, and this *Urban Greening Master Plan*.

RICHMOND GENERAL PLAN 2030

Richmond's *2030 General Plan*, "provides a policy framework to help the City maximize key opportunities and direct resources to improve its quality of life and cultivate a dynamic economy." The General Plan is the City's adopted framework for shaping the City's future and, as such, all other planning efforts in the City must be consistent with its goals and policies. As described in the General Plan, urban forests yield numerous benefits to the ecosystem by reducing local or neighborhood temperature, absorbing pollutants, removing and storing atmospheric carbon, softening noise, providing habitat for birds and other creatures, and improving overall air quality. Richmond's urban forest is home to diverse biological communities along its shoreline and in open space areas. Numerous native and heritage trees, many of which are large specimen trees representing a significant aspect of Richmond's history, also deserve recognition and attention. Goals and policies identified in the *2030 General Plan* which present synergies with the Urban Greening Master Plan include, but are not limited to, those outlined here.

OPPOSITE

Richmond paving and tree planting project circa 1920. Street is believed to be Cutting Boulevard.

Image Courtesy of the Richmond History Museum

SYNERGISTIC GOALS AND POLICIES FROM RICHMOND'S 2030 GENERAL PLAN

GOAL CN6 A Healthy Urban Environment

Elevate the quality of urban areas to support human development and provide residents with a healthy urban environment. Remediate contaminated soil and brownfield sites and properly manage mineral resource sites in order to contribute to improved public health and maximize opportunities to develop new uses. Enhance the natural beauty of the area by promoting design that respects landscape context, restoration of urban creeks, and creation of green streets and the stewardship of the urban forest.

POLICY CN6.2 Protection and Expansion of Tree Resources

Protect and expand tree resources within Richmond. Protect native trees and oak woodlands; expand and maintain street tree planning; use zoning and building requirements to ensure that trees are included in new development; and engage the community to undertake planting campaigns. Furthermore, promote trees as economic and environmental resources for the use, education and enjoyment of current and future generations.

ACTION CN6.E Urban Forestry

Implement landscaping practices in urban areas of the City to reduce heat island effect and contribute to carbon mitigation. Provide landscaping consistent with the "City of Richmond Urban Forest Management/Master Plan Reforestation Supplement (1997)", the City of Richmond Street Tree Inventory Report (2014) and any other adopted tree or vegetation ordinances or plans.

ACTION CN6.F Coordination with Utility Providers

Coordinate with utility providers to re-route utility lines that are in close proximity to native and other landmark trees. Work with utility providers to coordinate transmission line location and other potential impacts associated with undergrounding utilities.

The City of Richmond Street Tree Inventory Report (2014) and ordinance update project (also 2014) were based on the inventory initiated in the process of developing the Urban Greening Master Plan.

ACTION CN6.G Tree City USA Status

Maintain "Tree City USA" status by continuing to implement the revised Public and Private Tree Preservation ordinance and utilizing the urban Forest Committee to advise the City's Council on tree-related issues.

ACTION HW9.M Urban Forestry Management Plan

Continue to implement the urban forest management plan to guide landscaping practices in urban areas of the City, reduce the heat-island effect and contribute to carbon mitigation. Continue the adopt-a-tree program. Coordinate the plan with the "City of Richmond Urban Forest Management/Master Plan Reforestation Supplement (1997)" and related documents for this purpose. Update the plan to establish the following measures:

- » Create guidelines to establish minimum planting standards and require appropriate tree species and planting densities within newly landscaped areas;
- » Update the list of trees to be used as a guideline for all tree planting and focus on local native species;
- » Identify maintenance and planting standards for street trees, ensuring that the best practices in urban forestry are being utilized including best practices for pruning around above-ground utility lines to ensure the best health and form of street trees;
- » Update zoning requirements for street trees in new development and in parking lots;
- » Outline coordination efforts with East Bay Municipal Utilities District (EBMUD) to offer programs or other resources to provide property owners with information on proper tree selection, proper location to reduce heat transfer effects, planting and maintenance; and
- » Establish guidelines that require all native tree habitats to be protected and when avoidance is not possible, require mitigation efforts as required by the Public and Private Tree Preservation Ordinance.

RICHMOND LIVABLE CORRIDORS FORM-BASED CODE

Richmond’s Livable Corridors Form-Based Code¹ addresses economic vitality, environmental quality, and public health within Richmond’s downtown area and major commercial corridors. The Plan separates the City into six transect zones (T-zones): Preserve (T1), Rural (T2), Neighborhood Edge (T3), Neighborhood (T4), Urban Center (T5), and Urban Core (T6), together with a Special District (SD) designation for areas with specialized purposes (e.g., heavy industrial, transportation, entertainment, or university districts, among other possibilities).

As part of the Livable Corridors project, the City has prepared a Form-Based Code for three major commercial corridors in the City to encourage the development of a high quality public realm and to allow for a range of appropriate building uses. Upon adoption, the Form-Based Code will be an implementation tool that guides the transformation and revitalization of Macdonald Avenue, San Pablo Avenue, and 23rd Street into livable, walkable, and economically-thriving corridors. These three corridors provide over 300 street tree opportunity sites for expanding the urban forest and other greening opportunities. Street tree planting and in the case of San Pablo Avenue street improvements along these identified corridors are implementation projects specifically listed in the Urban Greening Master Plan.

The Form-Based Code includes guidelines for the design, construction, and maintenance of landscaping within the transect zones. In these zones, landscaping would be a major component of site design in order to create a city that has a strong landscaped character. Once the form-based code is adopted, these guidelines will apply as the minimum standard for all new projects and existing development with applications requiring approval of a planning permit. Consistent with this Urban Greening Master Plan, adoption and enforcement of the Livable Corridors Form-Based Code will promote tree planting and assist in expanding the City’s urban forest. Planting projects identified in this Urban Greening Master Plan that are located within these corridors will be implemented according to the provisions for tree planting and landscaping as outlined in the Form-Based Code.



The Richmond Transect has been defined to respond to the forms of places within the City, and covers the range of the Rural-to-Urban Transect from “T1” to “T6” as follows:

The **T1 Preserve** Transect Zone provides for natural or preserved lands in open state. It may include parks, squares, woodland, grasslands, trails, stormwater management features, and open space areas.

The **T2 Rural** Transect Zone provides for sparsely settled lands in open or cultivated state. It may include large lot residential where animals are raised, parks, squares, woodland, grasslands, trails, stormwater management features, and open space areas.

The **T3 Neighborhood Edge** Transect Zone provides opportunities for large lot single-family homes at the edge of town that provide a transition from the surrounding rural area while complimenting the surrounding neighborhoods.

The **T3 Neighborhood** Transect Zone builds upon the historic characteristics of the existing single-family neighborhoods while allowing them to evolve with smaller-scale, medium-density building types such as bungalow courts, duplexes, and mansion apartments that are compatible to their context.

The **T4 Neighborhood** Transect Zone provides a walkable, predominantly single-family neighborhood that integrates appropriate medium-density building types such as duplexes, mansion apartments, and bungalow courts within walking distance to transit and commercial areas.

The **T4 Main Street** Transect Zone provides a vibrant main-street commercial environment that serves as the focal point for the surrounding neighborhood and provides access to day-to-day amenities within walking distance

The **T5 Neighborhood** Transect Zone provides medium- to high-density housing in building types such as apartment houses, courtyard apartments, and mid-rise buildings that transition from the surrounding lower-density neighborhoods to the higher-density mixed-use neighborhoods.

The **T5 Main Street** Transect Zone provides a vibrant, walkable urban main street commercial area that provides locally and regionally serving commercial, retail, entertainment uses, and civic and public uses, as well as a variety of urban housing choices.

The **T6 Core** Transect Zone provides a high-density, vibrant, urban downtown that provides locally and regionally serving commercial, entertainment, and civic and public uses, as well as a variety of urban housing choices in main street mixed-use, mid-rise, and high-rise building types.

ABOVE

The Richmond Transect
Image Source:
Richmond Livable
Corridors Form-Based
Code Preamble, Richmond
Transect, Final Draft
February 2015

¹ A form-based code is a means of regulating development to achieve a specific urban form. In contrast to a more conventional zoning code, form-based codes, presented in diagrams and words, designate the appropriate form, scale and character of development rather than by distinctions in land-use types.

ZONING ORDINANCE UPDATE

Municipal zoning ordinances contain rules related to landscaping, parking, lighting, and building design, as well as the size and shape of new development. The City of Richmond updated and adopted its zoning ordinance in December 2016, since the existing zoning ordinance predated the City's 2030 General Plan. In the State of California, zoning ordinances must be updated following the adoption of a new General Plan to ensure consistency between policies. The zoning ordinance translates Richmond's General Plan into specific regulations to regulate land uses within the City of Richmond.

The zoning ordinance update provided the City with opportunities to modify development standards to encourage the use of sustainable elements in future development. The Urban Greening Master Plan will reinforce new policies established in the zoning ordinance.

CLIMATE ACTION PLAN

The City of Richmond's Climate Action Plan (CAP) provides a framework of policies and programs to achieve the City's health and environmental goals by operationalizing the community driven vision laid out by Richmond's General Plan 2030. The CAP also advances the vision of the Urban Agriculture Assessment, to support and achieve an equitable food system and increase access to affordable healthy foods for all Richmond residents.

The CAP acknowledges that green infrastructure, urban trees, and local agriculture all work in concert with the natural environment to make local landscapes more productive and provide benefits to local residents and ecosystems. The natural environment is important both for sequestering GHG emissions and for mitigating the impacts of climate change. By better integrating Richmond's built environment with the natural environment, the City will reduce its contribution to climate change while simultaneously addressing some of the present disproportionate impacts of sea-level rise, flooding and food accessibility.



ABOVE

Urban Forests can promote use of alternative methods of transportation such as public transit, bicycling, and walking.

RICHMOND BICYCLE MASTER PLAN

Adopted on November 1, 2011, Richmond's Bicycle Master Plan proposes over 100 miles of new bikeway facilities in addition to the 40 miles currently in place. Proposed bikeways, particularly Class I bike paths, which provide a completely separate right-of-way and are designated for the exclusive use of bicycles and pedestrians, provide greening opportunities. Planting trees along these proposed bicycle facilities will, in turn, enhance the

experience for bicyclists and pedestrians and promote the use of these alternative transportation modes.

The City has already accomplished a great deal to encourage bicycling in Richmond. Richmond has the longest and most scenic section of the Bay Trail and boasts more shoreline than any other city in the Bay Area. The Richmond Greenway provides a critical east-west Class I pathway connection across the center of the City. As such, the City has the potential to be a magnet for people seeking healthy lifestyles, particularly as the City's bicycle network develops.

RICHMOND PEDESTRIAN PLAN

On November 1, 2011, and in conjunction with the Bicycle Master Plan, the City adopted the Pedestrian Plan to improve the safety and convenience of walking throughout the City. The Plan establishes measures to create streets, sidewalks, and surroundings that calm traffic, invite people to walk, and provide positive places for community pride. The inclusion of urban greening elements in streetscape design is one way to further the goals of both the Pedestrian Plan and the Urban Greening Master Plan.

The Pedestrian Plan identifies the following design principles as the basis for recommendations that are intended to improve pedestrian (and bicycle) safety and mobility:

- » **Increased Safety.** Streets will be developed and retrofitted to accommodate all types of users. Designs and devices will produce speed moderation, visibility, awareness and communication for motorists and non-motorists alike.
- » **Improved Security.** Streets, trails and other public spaces will be designed and improved to create active places that are watched over, maintained and that project a sense of control and community ownership.
- » **Improved Connectivity.** A range of strategies and solutions will address physical barriers to walking, such as dead-end streets, railroad right of ways, wide roadways, and wide, complex intersections.
- » **Increased Equity.** Walking, the cheapest form of transportation will be a safe, viable and convenient choice for those who cannot afford, are unable, or choose not to drive a car.
- » **Improved Health.** Walking and bicycling, the healthiest forms of transportation will become desirable alternatives for trips to daily destinations.
- » **Increased Sustainability.** Walking and bicycling in the city will reduce the number of vehicle miles Richmond residents and visitors travel, and will reduce associated climate change, air and water quality impacts from vehicle emissions. Opportunities will be identified to convert excess paved rights of way to lower impact spaces with trees and landscaping.
- » **Neighborhood and Downtown Revitalization.** Improvements to the streets and pedestrian realm will set the stage for new investment in private property that can help fund improvements and attract development that supports walking, bicycling and the use of transit.

The Richmond 2030 General Plan identifies key corridors in Central Richmond that are integral to pedestrian and bicycle mobility. These key corridors include San Pablo Avenue, 23rd Street, Cutting Boulevard, Harbour Way, Marina Way, Carlson Boulevard, and Ohio Avenue. The City's General Plan envisions these corridors as places "characterized by high-quality pedestrian amenities, higher-density and mixed-use development, high levels of transit service, bicycle amenities and public gathering spaces." The Pedestrian Plan recommends specific improvements for each of these corridors, including landscaping. Implementation of the Urban Greening Master Plan would support the goals of the Pedestrian Plan by providing enhanced streetscapes and pedestrian paths that would improve safety and security and support the use of alternative transportation modes. Revitalization of these key corridors, where so many greening opportunities exist, will also support the City's goal of an expanded urban forest.

RICHMOND PARKS MASTER PLAN

Adopted on December 7, 2010, The Richmond Parks Master Plan provides both a long-term vision for the City's park system and specific policies and standards to direct day-to-day decisions. Its framework allows the City to respond to new opportunities as they arise. The Parks Master Plan identifies and evaluates the existing park system, assesses the need for additional park land, open space, and specialized facilities; establishes criteria and standards for site selection, design, and management of various areas; and recommends an approach to funding maintenance, acquisition, and development of facilities. Consistent with the City's General Plan, sustainability and ecological design concepts have been incorporated into the Parks Master Plan, including policies supporting air quality, water quality, soil health, energy efficiency, protection of habitat and sustainable urban design and building design practices. Richmond's parks, public plazas and open spaces create a strong sense of community, promote health and wellness, and protect historical and cultural amenities that are part of the City's legacy. Richmond's integrated system of parks provides public access to the San Pablo Peninsula, large-scale open spaces, neighborhoods, schools, urban parks, recreational facilities and other key destinations.

As the City addresses its park needs, land will be available for planting trees and landscaping. The Parks Master Plan recommends the addition of a landscape that supports wildlife, provides food (community gardens) or provides other ecological functions. Creek crossings and drainage swales in various park sites can be expanded and incorporated into habitat sites. This work is consistent with direction included in the Urban Greening Master Plan. Planting trees in as many city-owned properties as possible is suggested by the Urban Greening Master Plan and it is in this way that it supports the recommendations of the Parks Master Plan.

URBAN AGRICULTURE ASSESSMENT

In 2011, the City prepared an Urban Agriculture Assessment to determine the potential for, and role of, urban agriculture in achieving an equitable food system in Richmond. The Richmond Urban Agriculture Assessment is a tool to better understand existing types of urban agriculture activities, types of activities might be developed in the future to meet identified needs, and how the food produced through urban agriculture activities fits into the broader system of food production and distribution that shapes how Richmond residents eat. As part of the Assessment, lands in Richmond with the potential to support expanded or new urban agriculture activities at multiple scales were identified and mapped. These sites represent additional greening opportunities, beyond those identified in this Urban Greening Master Plan, to further the City's greening efforts and promote the equitable distribution of green spaces throughout the City. The Assessment asserts that mapping these areas can help the City and other partners identify which neighborhoods can most benefit from targeted education and outreach efforts around urban agricultural and home gardens. These outreach efforts can also be used to promote edible and shade tree planting and expansion of the urban forest, one of the primary goals of the Urban Greening Master Plan.

In addition to efforts made by the City to expand the urban forest, a number of recent initiatives have been undertaken by community groups to expand, maintain, and fund Richmond's urban forest.

3.02 CITY TREE INVENTORY

In 2012, the City of Richmond received a California Department of Forestry and Fire Protection (Cal Fire) Urban and Community Forestry Program Grant through Proposition 84 to update Richmond's Tree Ordinance (R.M.C. Chapter 10.08) and complete an inventory of city-owned trees, including street trees, park trees, and trees on city-owned property. The Citywide Tree Inventory was completed in July 2013. According to data from the inventory, Richmond has a total of 22,051 City-maintained trees and over 13,000 planting areas available for new tree plantings. The tree inventory reflects the results of data collected in 2012 and 2013 to establish an initial survey of baseline conditions upon which future progress can be assessed. This database is actively updated as trees in the City are planted or removed.

OVERVIEW OF THE INVENTORY PROCESS

The tree inventory began with a preliminary survey followed by a formal, field inventory which counted all existing city-owned trees and inventoried potential planting sites for street trees within the City limits. The initial tree survey was conducted using the street view feature of Google maps to survey the existing City street trees. Findings were recorded in i-Tree, a software database program that was developed by the USDA Forest Service to record data about urban forests. In conducting the survey, information was organized according to 13 zones (corresponding to neighborhood boundaries) established by the City (Figure 3.1). In each zone, surveyors went street-by-street and address-by-address recording their findings.

For each address, surveyors recorded the trees in the direction of auto travel on each side of the street. In general, the parking strip in front of most residential and commercial buildings contains two City-owned street trees. The data recorded for each tree included its genus, species, approximate height and trunk diameter, presence or absence of overhead wires, and general appearance (e.g., healthy or diseased). Each of these factors were noted and entered into i-Tree to create a digital database of all City-owned trees. Sidewalk damage (e.g., heaving, cracks, or other damage from trees) was also noted. GPS coordinates were logged for each tree with the use of Google Maps.

As part of the tree survey, surveyors identified greening or tree planting opportunities, such as places with tree wells, but no trees. The new planting sites vary in size and site constraints but offer the potential of planting a compatible tree species within the opportunity space. Existing historic planting and maintenance records generated by city staff of city-owned trees were also added to the database.

Eventually, the city applied for and received a Cal Fire grant to employ the Davey Tree Expert Company (Davey Tree) to perform a physical inventory of all city trees using hand-held GPS devices and their proprietary data-gathering program to record their findings.

BELOW

Typical Property with City-Owned Trees in Right-of-Way



ABOVE

Typical Residential Property with Street Tree Planting Opportunity in Right-of-Way

The Davey Tree data forms the basis for the assessment of Richmond’s existing urban forest described in this section and was converted to the ‘TreeTrak’ program developed for the City by MacNair & Associates. TreeTrak is a tree inventory software tool developed to standardize City tree data that meets Cal Fire grant requirements, incorporates existing historic data and integrates with i-Tree software. TreeTrak is a Filemaker database program that allows field data collection to be performed using an iPad with minimum expense for data collection equipment. The advantages of TreeTrak are that Filemaker is a cross-platform software allowing data to be compiled and viewed on either an Apple or PC. TreeTrak is non-proprietary program with no recurring fees for use. The program is easy to use and modify as needed. Tree data can be exported and imported in a wide range of database formats including Excel spreadsheets or other databases including iTrees. Further the use of the iPad allows for images and GPS collection in one device.

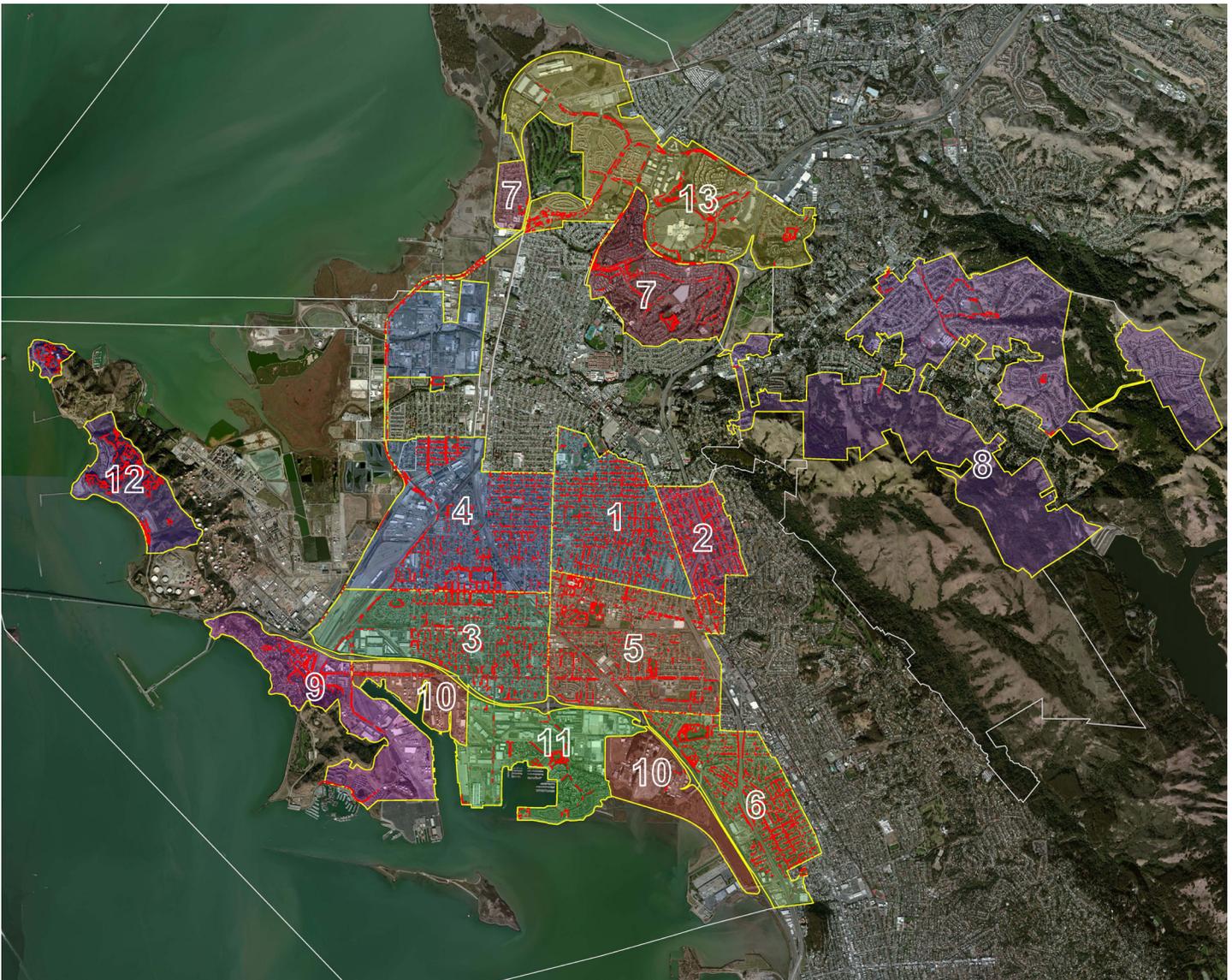
BELOW

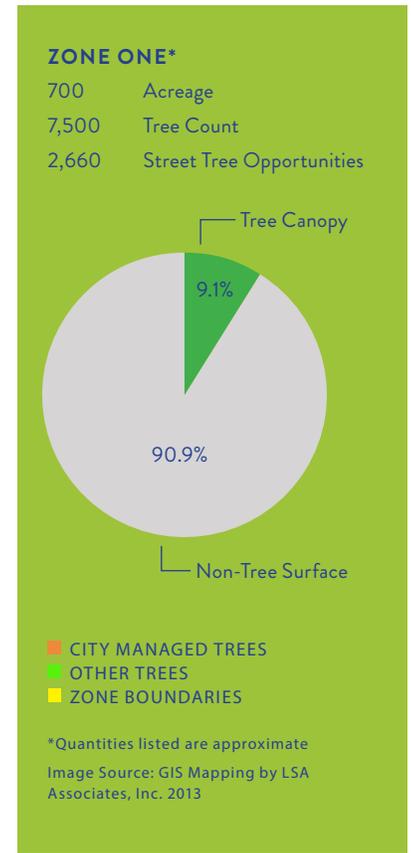
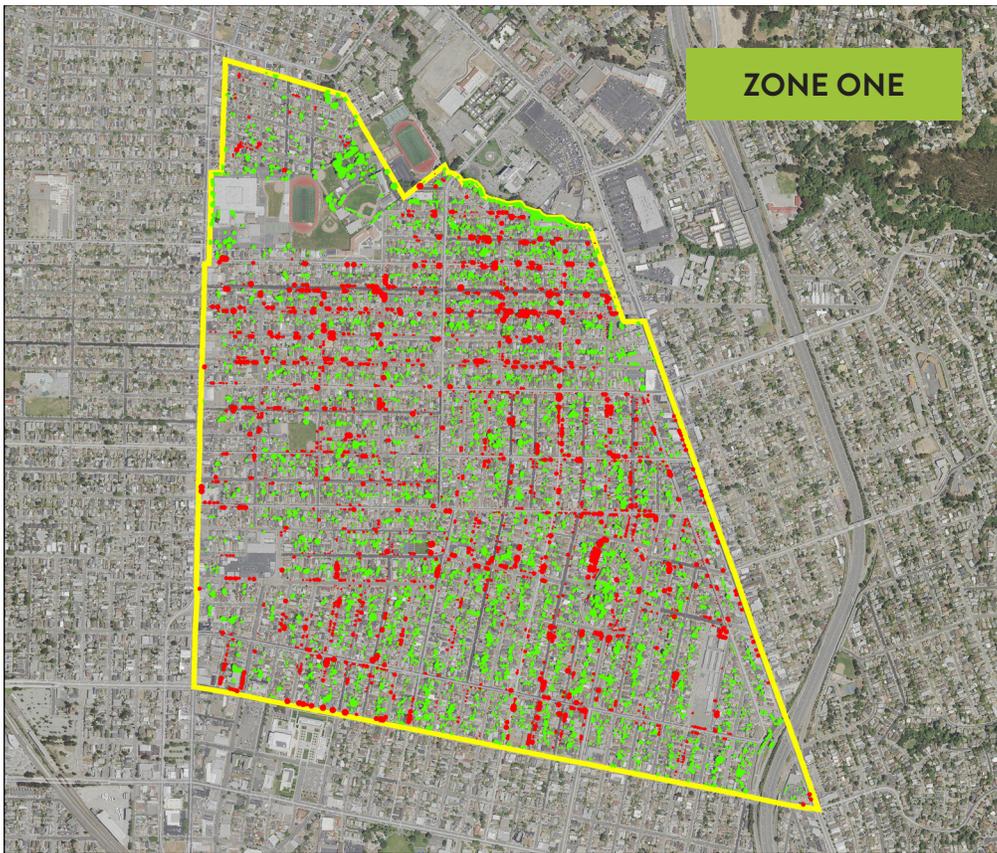
Figure 3.1

Map of Inventoried Trees By Zone. The red dots show locations of City-owned trees.

3.03 ANALYSIS BY ZONE

The City of Richmond established 13 zones based on neighborhood boundaries to record survey information (Figure 3.1). A brief analysis of each zone is provided in this section.





ZONE ONE: NORTH AND EAST NEIGHBORHOOD

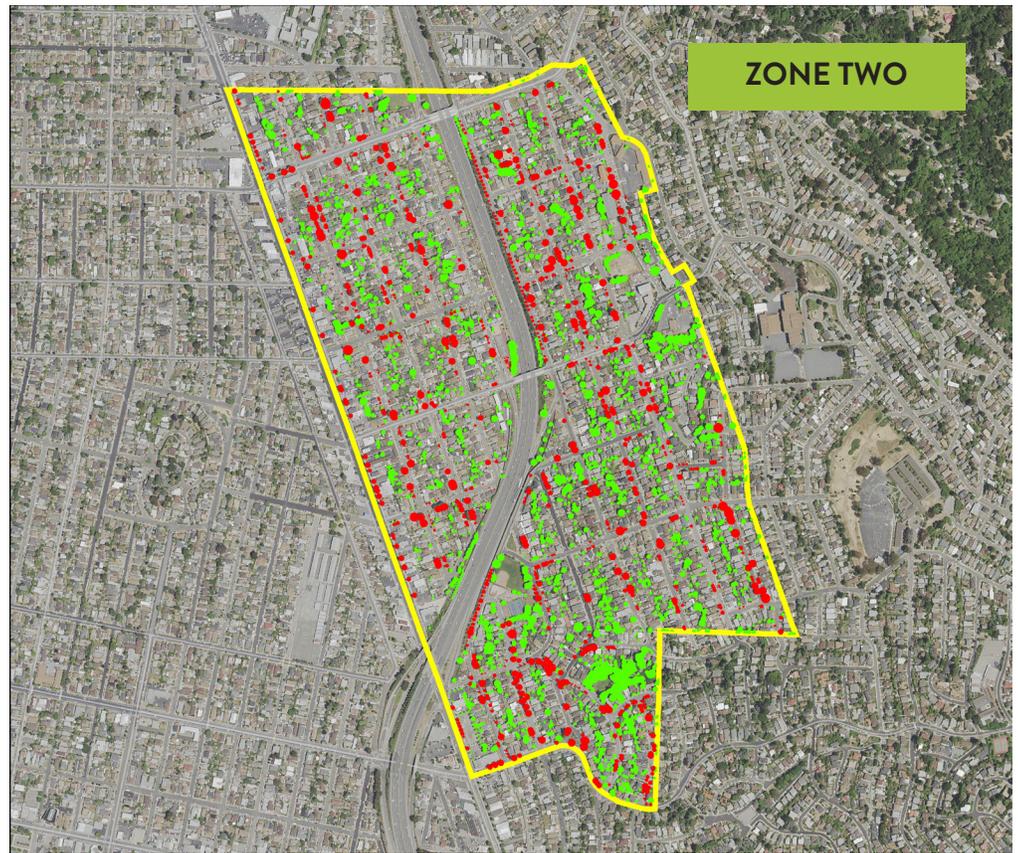
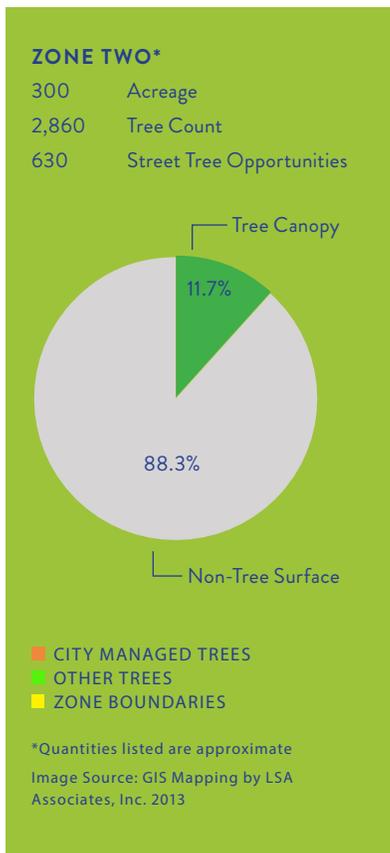
Zone One (Figure 3.2) encompasses the North and East Neighborhood, which is roughly bounded by San Pablo Avenue, Macdonald Avenue, 23rd Street and the City of San Pablo. This neighborhood is primarily residential with approximately 5,000 homes.

Zone One covers approximately 700 acres and supports approximately 2,500 City-owned trees and over 5,000 privately-owned and/or open space trees. The overall tree canopy cover is approximately 9.1%. Trees are fairly evenly distributed throughout this zone and consist primarily of street trees along residential roads, and trees planted in residents' yards.

The five most prevalent tree species in Zone One include Chinese pistache (*Pistacia chinensis*), water gum/kanooka (*Tristanopsis laurina*), Southern magnolia (*Magnolia grandiflora*), purpleleaf plum (*Prunus cerasifera*), and common crapemyrtle (*Lagerstroemia indica*). Although this is an old, well-established neighborhood, the majority of trees in this zone (approximately 75%) are less than 12 inches in diameter. Approximately 2,660 street tree opportunity sites of varying sizes were identified in Zone One as part of the tree survey. These opportunity sites are scattered along the streets within this zone.

ABOVE

Figure 3.2
Zone 1 Analysis Map



ABOVE

Figure 3.3

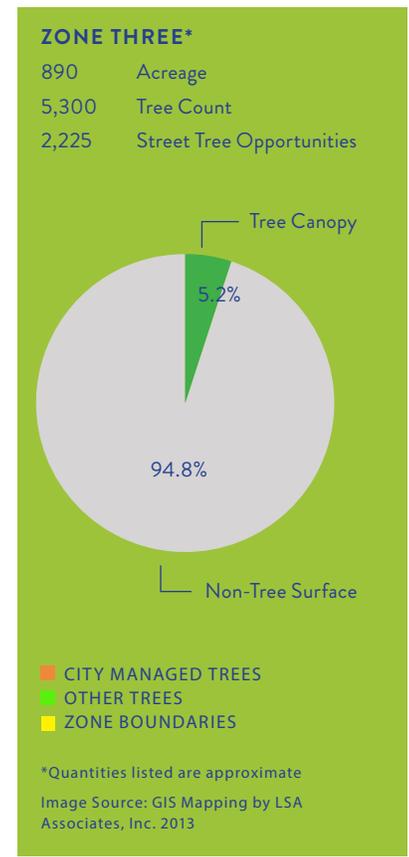
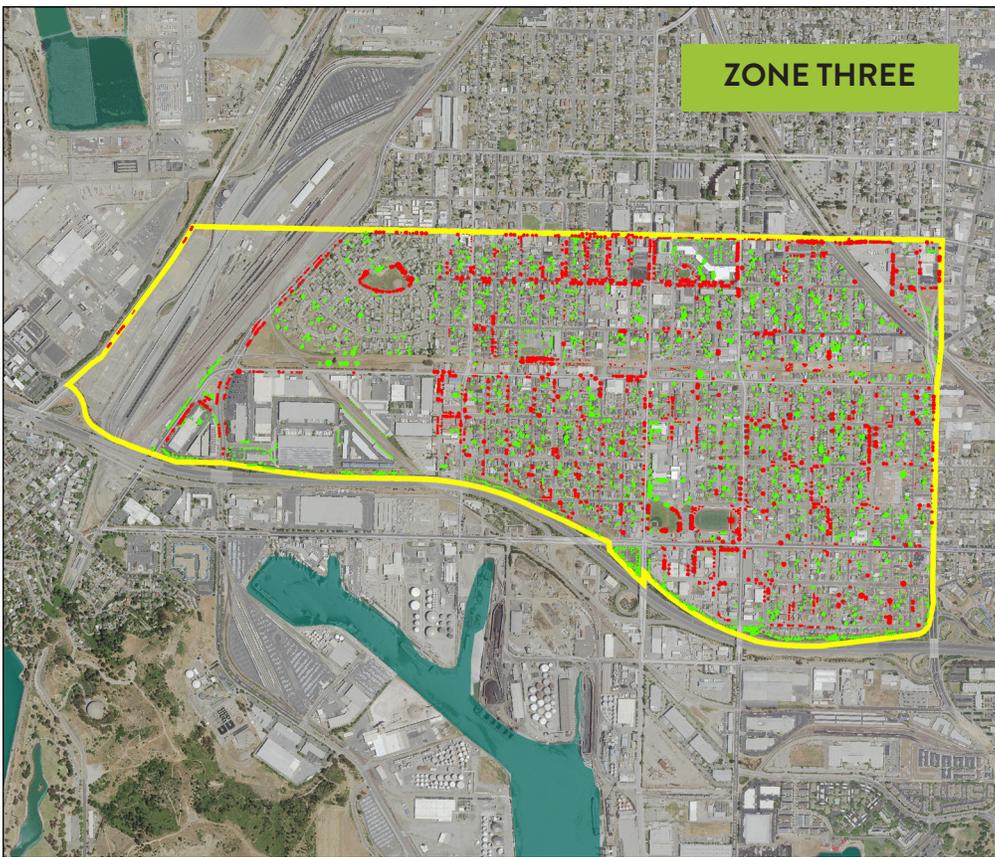
Zone 2 Analysis Map

ZONE TWO: EAST RICHMOND HEIGHTS NEIGHBORHOOD

Zone Two (Figure 3.3) consists of the East Richmond Heights neighborhood, located west and east of Interstate 80. Also known as Mira Vista, this zone is bordered by the North and East neighborhood to the west, the City of San Pablo to the north, the unincorporated community of East Richmond Heights to the east and the City of El Cerrito to the south. This zone is mostly residential with some areas of commercial use. There are also areas of recreational and public/civic uses, such as schools and parks.

Zone Two covers approximately 300 acres and supports approximately 1,057 City-owned trees and over 1,800 additional trees. This zone encompasses approximately 300 acres with a tree canopy cover of 11.7%. Trees are fairly evenly distributed throughout this zone along residential roads and in private yards, with concentrations of trees at Mira Vista Park and Tiller Park. The five most prevalent tree species in this zone include Camphor tree (*Cinnamomum camphora*), purpleleaf plum (*Prunus cerasifera*), Southern magnolia (*Magnolia grandiflora*), Chinese elm (*Ulmus parvifolia*), and strawberry tree (*Arbutus unedo*). The majority of trees in this zone (approximately 72%) are less than 12 inches in diameter.

Approximately 630 street tree opportunity sites of varying sizes were identified in this zone as part of the tree survey. These opportunity sites are scattered along the streets within this zone.



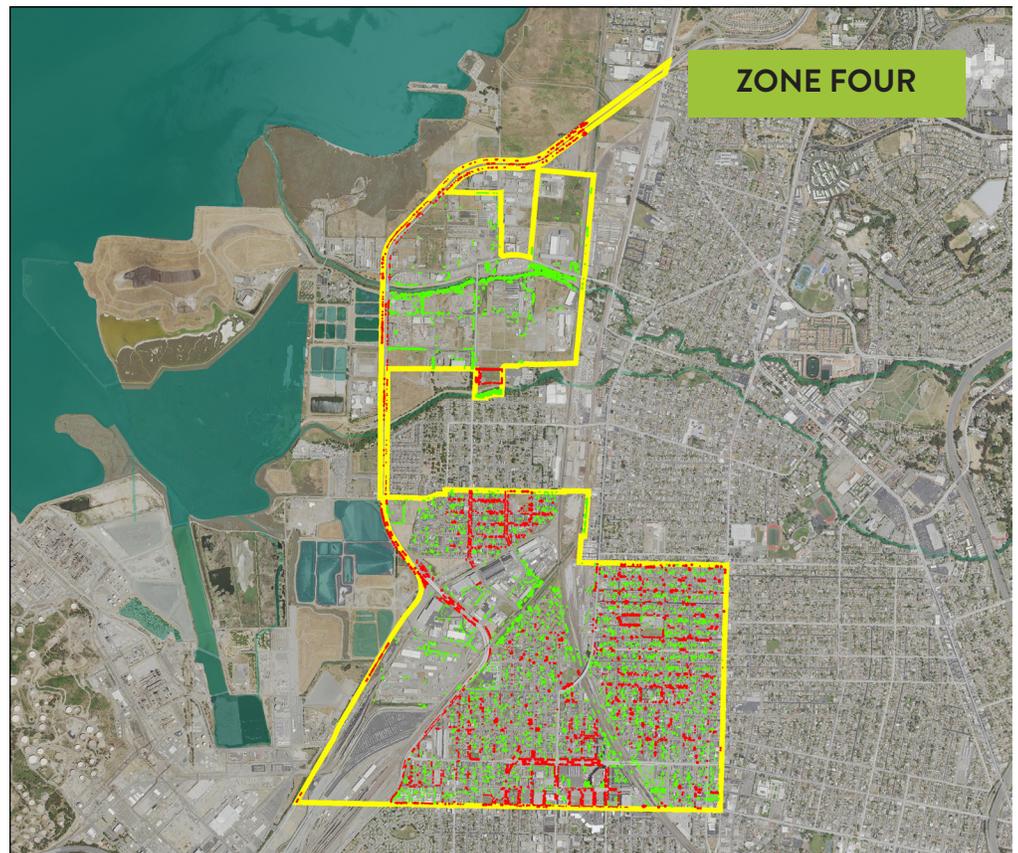
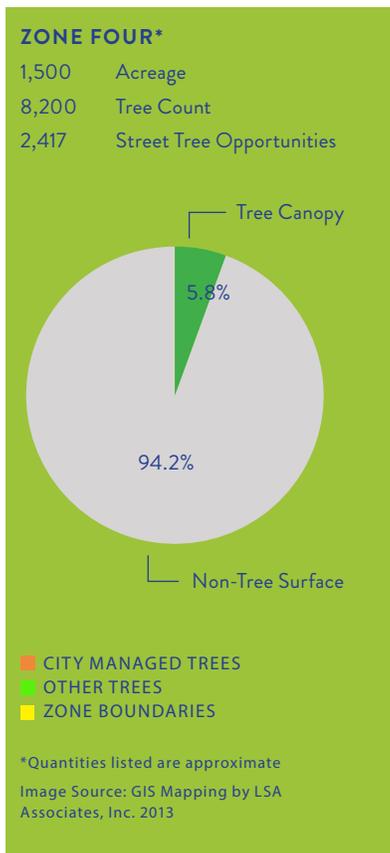
ZONE THREE: ATCHISON VILLAGE, CITY CENTER, SANTA FE, AND CORONADO NEIGHBORHOODS

Zone Three (Figure 3.4) encompasses several neighborhoods including Atchison Village, City Center, Santa Fe, and Coronado. It is bounded by Macdonald Avenue to the north, South 23rd Street to the east, Interstate 580 to the south, and Garrard Boulevard to the west. Zone Three is primarily a single and multifamily residential area with some public/civic, commercial, and recreational uses.

Zone Three covers approximately 890 acres and supports approximately 2,100 street trees and over 3,200 additional trees with a tree canopy cover of 5.2%. The five most prevalent tree species in this zone include Callery pear (*Pyrus calleryana*), London planetree (*Platanus x acerifolia*), Chinese elm (*Ulmus parvifolia*), red maple (*Acer rubrum*), and sweetgum (*Liquidambar styraciflua*). The majority of trees in this zone (approximately 73 %) are less than 12 inches in diameter.

Approximately 2,225 street tree opportunity sites of varying sizes were identified in Zone Three as part of the tree survey. These opportunity sites are concentrated in the City Center, Coronado, and Santa Fe neighborhoods in the western portion of this zone.

ABOVE
Figure 3.4
Zone 3 Analysis Map



ABOVE

Figure 3.5

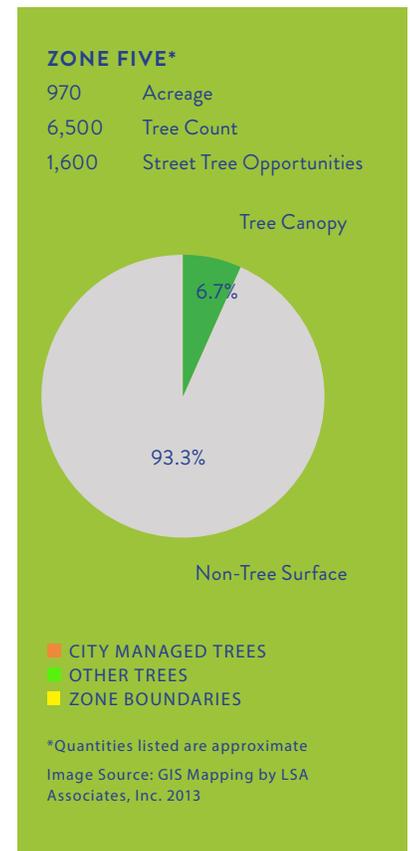
Zone 4 Analysis Map

ZONE FOUR: IRON TRIANGLE, BELDING/WOODS, AND SHIELDS-REID NEIGHBORHOODS

Zone Four (Figure 3.5) consists of the Iron Triangle, Belding/Woods, and Shields-Reid neighborhoods as well as the area north of Wildcat Creek. This zone is bounded by Richmond Parkway to the north, Martin Drive to the west, Macdonald Avenue to the south, and 26th Street to the east. This Zone contains a variety of land uses including residential, parks, schools, the downtown Richmond business district, and commercial areas on Cutting Boulevard and near Interstate 580.

Covering approximately 1,500 acres, Zone Four supports approximately 3,400 street trees and over 4,800 other trees with a tree canopy cover of 5.8%. Trees are scattered throughout this zone; however, concentrations of City-owned trees are located along Richmond Parkway, Barrett Avenue, Macdonald Avenue, and around neighborhood parks including Belding-Garcia Park and Shields-Reid Park. Trees are also concentrated along Wildcat and San Pablo Creeks. The five most prevalent tree species in this zone include Callery pear (*Pyrus calleryana*), London planetree (*Platanus x acerifolia*), coast live oak (*Quercus agrifolia*), coast redwood (*Sequoia sempervirens*), and myoporum (*Myoporum laetum*). The majority of trees in this zone (approximately 75%) are less than 12 inches in diameter.

Approximately 2,417 street tree opportunity sites of varying sizes were identified in Zone Four as part of the tree survey. These opportunity sites are concentrated along the streets in the Belding/Woods neighborhood and in the western portion of the Iron Triangle.



ZONE FIVE: RICHMOND VILLAGE/METRO SQUARE, PULLMAN, CORTEZ/STEGE, LAUREL PARK, AND PARK PLAZA NEIGHBORHOODS

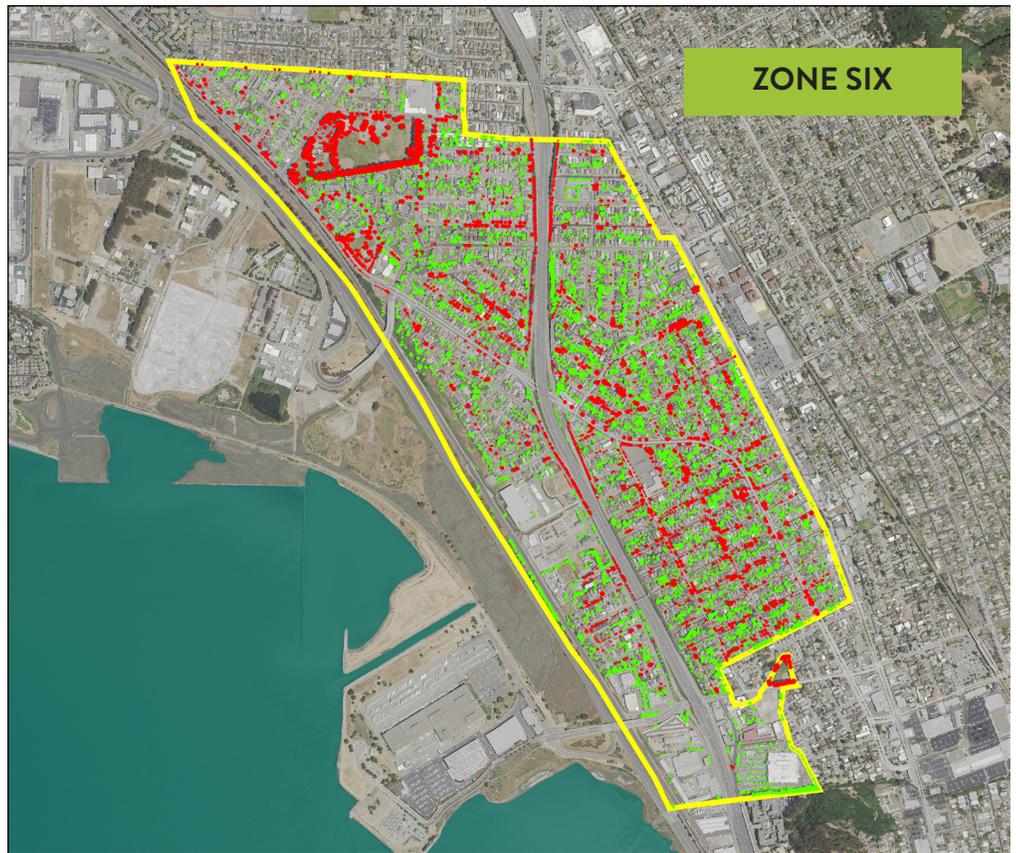
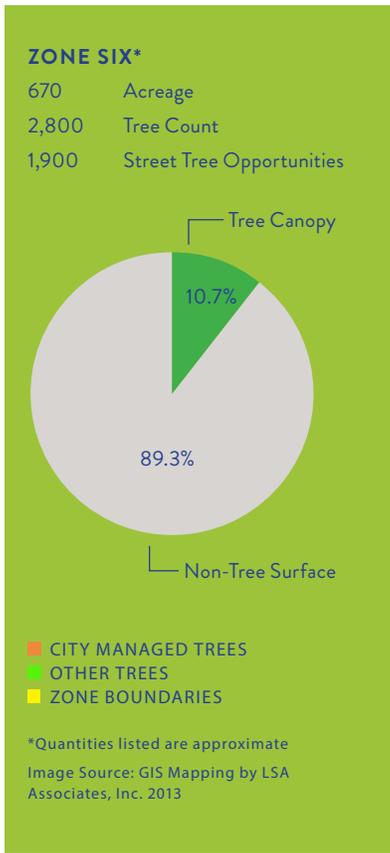
Zone Five (Figure 3.6) encompasses several Richmond neighborhoods including Richmond Village/Metro Square, Pullman, Cortez/Stege, Laurel Park, and Park Plaza. This zone is bounded by Barrett Avenue to the north, South 23rd Street to the west, Potrero Avenue to the south, and San Pablo Avenue to the east. This zone is primarily residential.

Zone Five covers approximately 970 acres and supports approximately 2,500 street trees and over 4,000 other trees with a tree canopy cover of 6.7%. City-owned trees in this zone are located primarily along major arterials (e.g., Cutting Boulevard, Potrero Avenue, Berk Avenue, San Pablo Avenue, Macdonald Avenue, 24th Street) and City parks, including John F. Kennedy Park, State Court Park, and Nicholl Park. The five most prevalent tree species in this zone include London planetree (*Platanus x acerifolia*), coast redwood (*Sequoia sempervirens*), Brisbane box (*Lophostemon confertus*), Callery pear (*Pyrus calleryana*), and sweetgum (*Liquidambar styraciflua*). The majority of trees in this zone (approximately 70%) are less than 12 inches in diameter.

Approximately 1,600 street tree opportunity sites of varying sizes were identified in Zone Five as part of the tree survey. These opportunity sites are concentrated in the Park Plaza and Pullman neighborhoods between Cutting Boulevard and 22nd Street.

ABOVE

Figure 3.6
Zone 5 Analysis Map



ABOVE

Figure 3.7

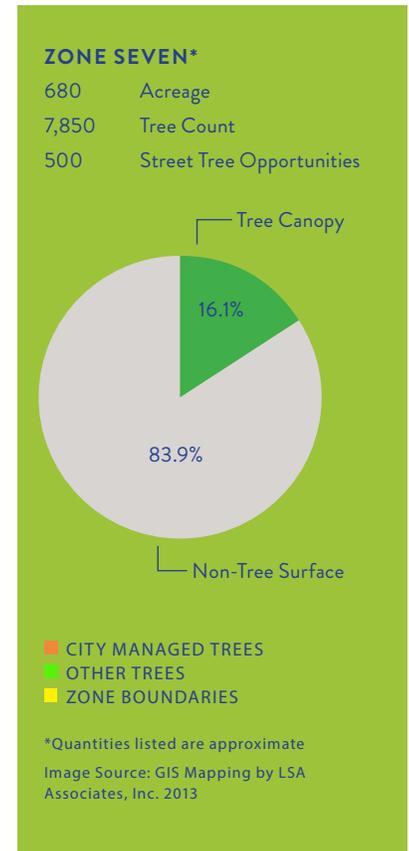
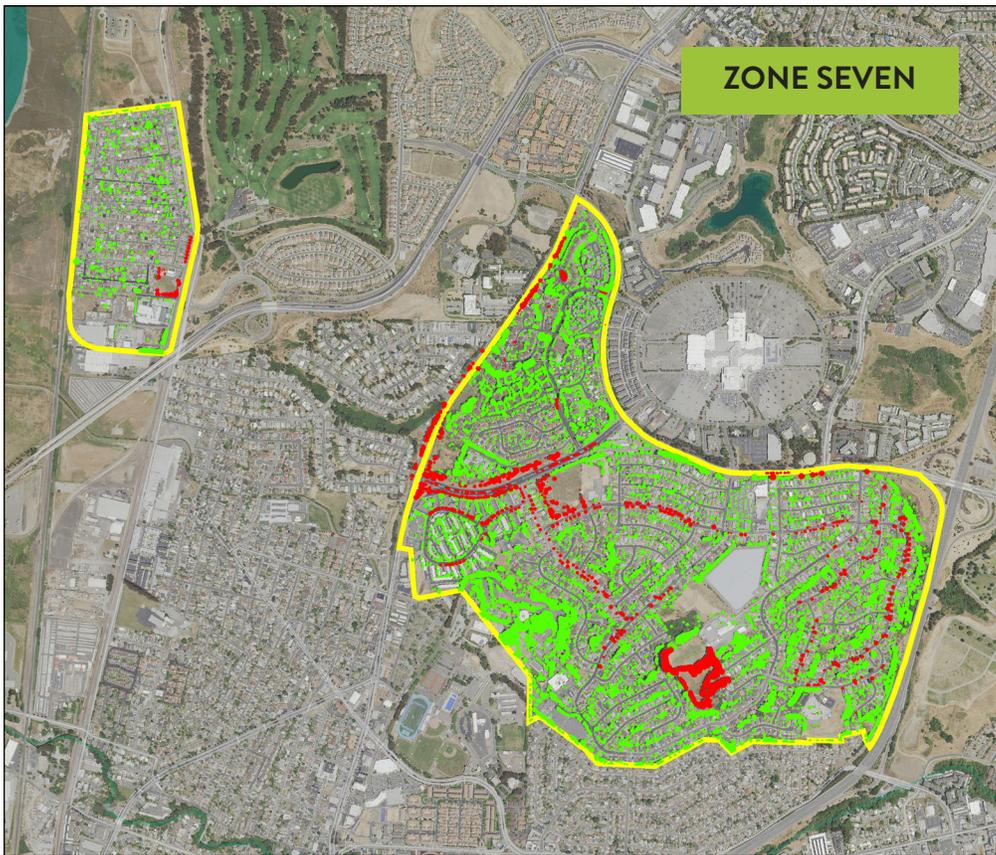
Zone 6 Analysis Map

ZONE SIX: EASTSHORE, PARKVIEW, PANHANDLE ANNEX AND RICHMOND ANNEX NEIGHBORHOODS

Zone Six (Figure 3.7) consists of the Eastshore, Parkview, Pandhandle Annex and Richmond Annex neighborhoods. It is located between San Pablo Avenue/El Cerrito on the east and Interstate 580 on the west, Potrero Avenue to the north, and the El Cerrito city limits to the south. This zone is primarily residential.

Zone Six covers approximately 670 acres and supports approximately 2,800 street trees and over 5,700 other trees with a tree canopy cover of 10.7%. Street trees and privately-owned trees are fairly evenly distributed throughout this zone. Booker T. Anderson Park has a concentration of City-owned trees. The five most prevalent tree species in this zone include Brisbane box (*Lophostemon confertus*), Chinese pistache (*Pistachia chinensis*), Chinese elm (*Ulmus parvifolia*), water gum/kanooka (*Tristanopsis laurina*), and blue gum eucalyptus (*Eucalyptus globulus*). The majority of trees in this zone (approximately 73%) are less than 12 inches in diameter.

Approximately 1,900 street tree opportunity sites of varying sizes were identified in Zone Six as part of the tree survey. These opportunity sites are scattered along the streets throughout this zone.



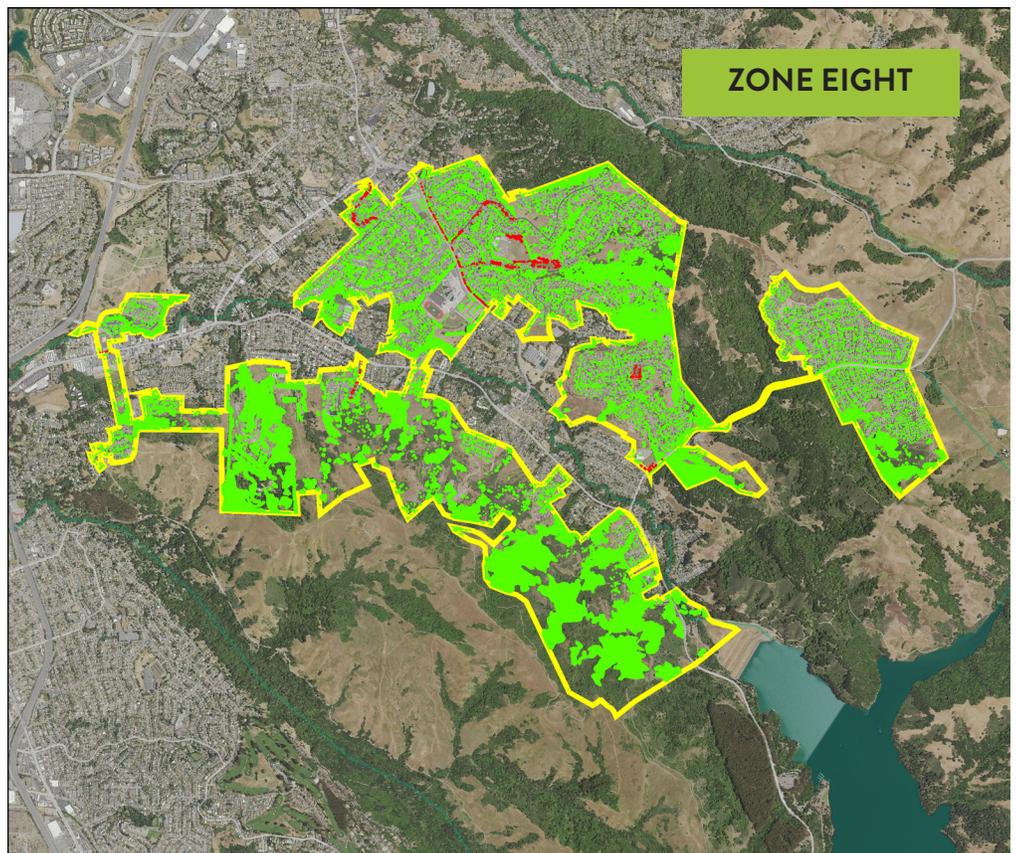
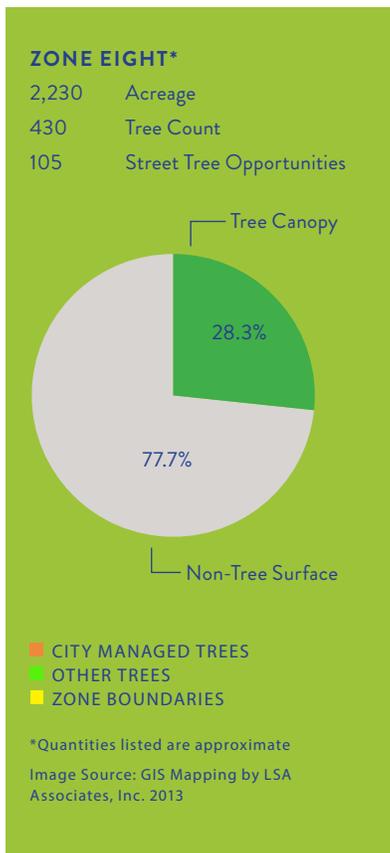
ZONE SEVEN: FAIRMEDE/HILLTOP AND HILLTOP VILLAGE NEIGHBORHOODS

Zone Seven (Figure 3.8) combines the Fairmede/Hilltop and Hilltop Village neighborhoods in northeastern Richmond, and Parchester Village in northwestern Richmond. The Hilltop area is bounded by Hilltop Drive/Robert Miller Drive to the north, 23rd Street to the west, Interstate 80 to the east, and various residential streets to the south. The Fairmede/Hilltop and Hilltop Village neighborhoods contain primarily commercial and residential uses. Parchester Village is bordered by Point Pinole Regional Shoreline Park and the Western Contra Costa Detention Center to the north, Atlas Road to the east, Richmond Parkway to the southeast, grassland flats to the south and Breuner Marsh and San Pablo Bay to the west. Parchester Village is primarily residential.

Zone Seven covers approximately 680 acres and supports approximately 1,200 street trees and over 6,650 other trees with a tree canopy cover of 16.1%. The tree canopy in this zone is dominated by privately-owned trees consisting of tree belts (lines of trees) associated with residential areas and apartment complexes. In this zone, most of the City-owned trees are located along San Pablo Avenue, Robert Miller Drive, Birmingham Drive, and Groom Drive and at Hilltop and Fairmede Parks. The five most prevalent tree species in this zone include Monterey pine (*Pinus radiata*), blue gum eucalyptus (*Eucalyptus globulus*), coast live oak (*Quercus agrifolia*), Chinese elm (*Ulmus parvifolia*), and Sydney golden wattle (*Acacia longifolia*). Approximately 44% of the trees in this zone are less than 12 inches in diameter. The majority (approximately 73%) are between 6 and 30 inches in diameter. Approximately 500 street tree opportunity sites of varying sizes were identified in Zone Seven as part of the tree survey. These opportunity sites are concentrated along Hilltop Drive and Rollingwood Drive in this zone.

ABOVE

Figure 3.8
Zone 7 Analysis Map



ABOVE

Figure 3.9

Zone 8 Analysis Map

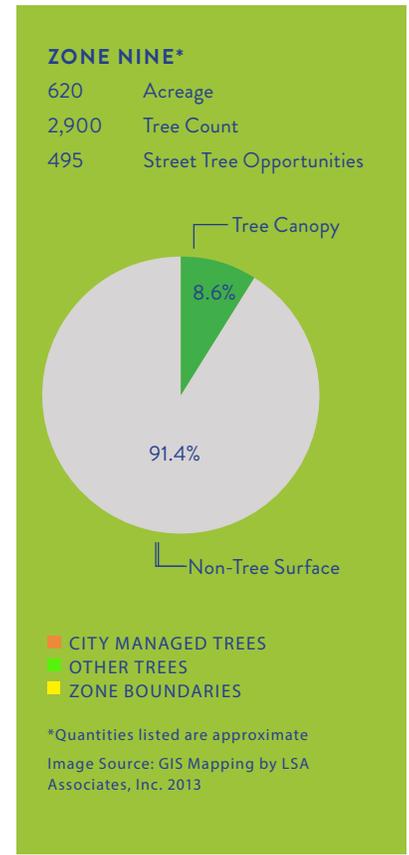
ZONE EIGHT: NORTHEASTERN RICHMOND NEIGHBORHOODS

Zone Eight (Figure 3.9) consists primarily of low-density residential uses and combines several neighborhoods in northeastern Richmond, including May Valley, El Sobrante Hills, Greenbriar, Carriage Hills North, Castro Heights, Carriage Hills South, Greenridge, Quail Hill, and Hasford Heights. This zone extends to the northeastern limits of the City of Richmond and is bounded to the south by Wildcat Canyon Regional Park, a large regional open space area. San Pablo Dam Road bisects this zone.

Zone Eight supports approximately 430 street trees and approximately 660 acres² of other trees with a tree canopy cover of 28.3%. The tree canopy in this zone consists primarily of trees associated with undeveloped open space areas in the north and south. Relatively few City-owned trees have been planted in this zone. These City-owned trees are located along Valley View Road, Morningside Drive, and May Road. The five most prevalent tree species in this zone include Chinese elm (*Ulmus parvifolia*), coast live oak (*Quercus agrifolia*), London planetree (*Platanus x acerifolia*), Callery pear (*Pyrus calleryana*), and Monterey pine (*Pinus radiata*). Approximately 80% of the trees in this zone are less than 18 inches in diameter.

The tree survey identified only 105 street tree opportunity sites of varying sizes in this zone. These opportunity sites are concentrated on several residential roads in this zone including Morwood Drive, Morningside Drive, May Road, and Fran Road.

2 Due to the amount of undeveloped open space in this zone and the density of trees in these open space areas, it was infeasible to map individual trees in the open space areas. Instead, aerial photography was used to map groves of trees in these areas.



ZONE NINE: POINT RICHMOND

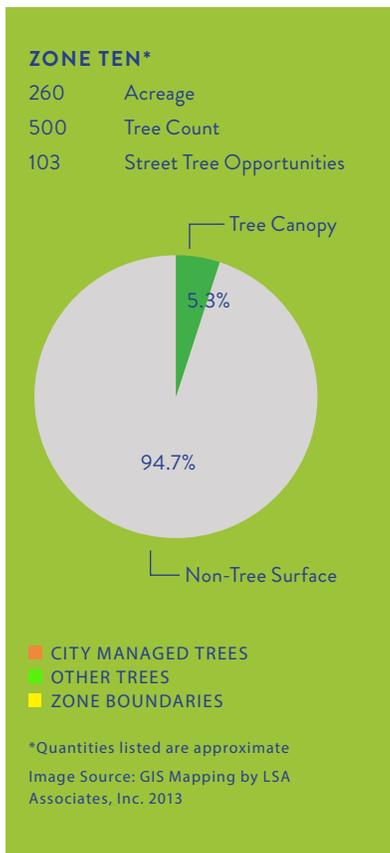
Zone Nine (Figure 3.10) includes the Point Richmond neighborhood. This zone is bounded by Interstate 580/Richmond-San Rafael Bridge to the north, San Francisco Bay to the west and south and the Richmond Harbor on the east. This zone encompasses a variety of uses including industrial, commercial, office, residential, parks and open space and public/civic uses.

Zone Nine covers approximately 620 acres and supports approximately 1,100 street trees and over 1,800 other trees with a tree canopy cover of 8.6%. City-owned trees are concentrated along major arterials and other roadways including Canal Boulevard, Cutting Boulevard, Garrard Boulevard, Richmond Avenue, Railroad Avenue, and Seaclyff Drive. Other trees are scattered throughout this zone with concentrations of trees located in undeveloped areas between residential developments. The five most prevalent tree species in this zone include Callery pear (*Pyrus calleryana*), water gum/kanooka (*Tristanopsis laurina*), London planetree (*Platanus x acerifolia*), myoporum (*Myoporum laetum*), and Raywood Ash (*Fraxinus angustifolia*). Approximately 76% of the trees in this zone are less than 12 inches in diameter.

The tree survey identified only 495 street tree opportunity sites of varying sizes in this zone. These opportunity sites are located along the streets in Point Richmond, and along Sea Cliff Drive, Dornan Drive, and Canal Boulevard.

ABOVE

Figure 3.10
Zone 9 Analysis Map



ABOVE

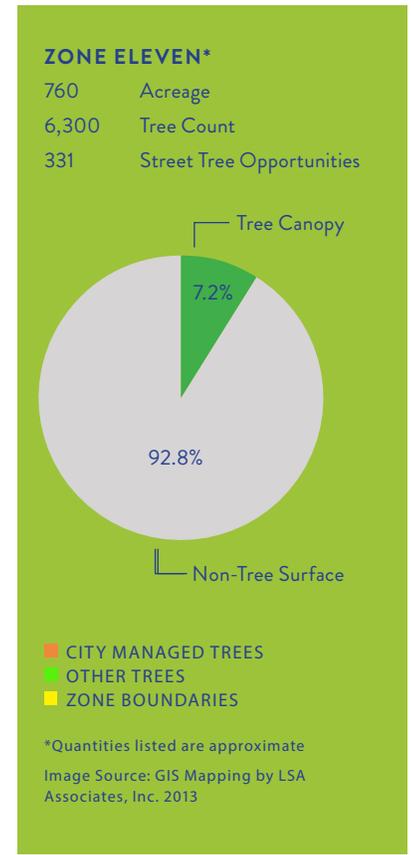
Figure 3.11
Zone 10 Analysis Map

ZONE TEN: MARINA BAY AND SOUTHWEST RICHMOND ANNEX NEIGHBORHOODS

Zone Ten (Figure 3.11) includes portions of the Marina Bay and Southwest Richmond Annex neighborhoods. This zone encompasses primarily industrial and port uses. It is bounded by Interstate 580 to the north, Canal Boulevard to the west, the Richmond Inner Harbor to the south and Central Avenue to the southeast. As described above, this zone includes primarily business and industrial uses.

Zone Ten covers approximately 260 acres and supports approximately 229 street trees and over 1,480 other trees with a tree canopy cover of 5.3%. Most of the trees in this zone are privately-owned and concentrated along Seaver Avenue. Few City-owned trees are located in this zone. The five most prevalent tree species in this zone include Raywood ash (*Fraxinus angustifolia*), red maple (*Acer rubrum*), pin oak (*Quercus palustris*), Callery pear (*Pyrus calleryana*), and blackwood acacia (*Acacia melanoxylon*). Approximately 98% of the trees in this zone are less than 12 inches in diameter.

The tree survey identified only 103 street tree opportunity sites of varying sizes in this zone. These opportunity sites are primarily located on Meade Street adjacent to Interstate 580.



ZONE ELEVEN: MARINA BAY NEIGHBORHOOD

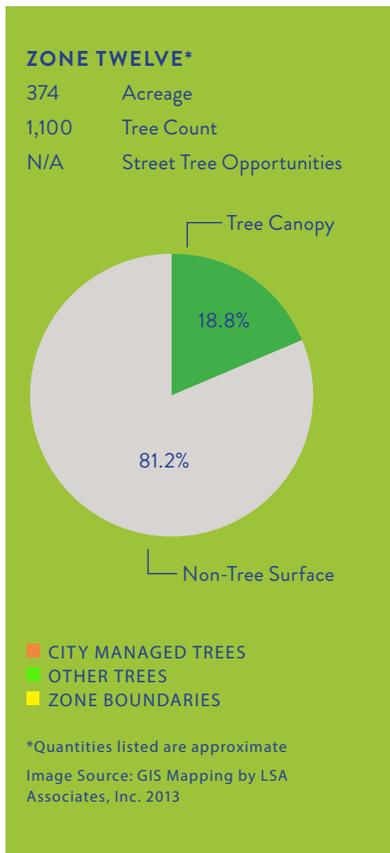
Zone 11 (Figure 3.12) encompasses most of the Marina Bay neighborhood. It extends from Interstate 580 to the San Francisco Bay. East to west, its boundaries extend from approximately Harbour Way South on the west to Regatta Boulevard on the east. Like Zone 10, this zone includes industrial and port uses along with some residential, mixed use, and park/open space uses. The Rosie the Riveter World War II Homefront, a National Historical Park is also located in this zone.

Zone Eleven covers approximately 760 acres and supports approximately 580 street trees and over 5,700 other trees with a tree canopy cover of 7.2%. In this zone, City-owned trees are located primarily along Marina Bay Parkway and within local parks, including Barbara and Jay Vincent Park, Shimada Friendship Park, and Marina Park. Most other trees are privately-owned and associated with residential and commercial development. The five most prevalent tree species in this zone include Monterey cypress (*Hesperocyparis macrocarpa*), Raywood ash (*Fraxinus angustifolia*), Callery pear (*Pyrus calleryana*), Monterey pine (*Pinus radiata*), and white alder (*Alnus rhombifolia*). Approximately 72% of the trees in this zone are less than 18 inches in diameter.

The tree survey identified only 331 street tree opportunity sites of varying sizes in this zone. These opportunity sites are primarily located on Harbour Way South, Regatta Boulevard, and Marina Way South.

ABOVE

Figure 3.12
Zone 11 Analysis Map



ABOVE

Figure 3.13
Zone 12 Analysis Map

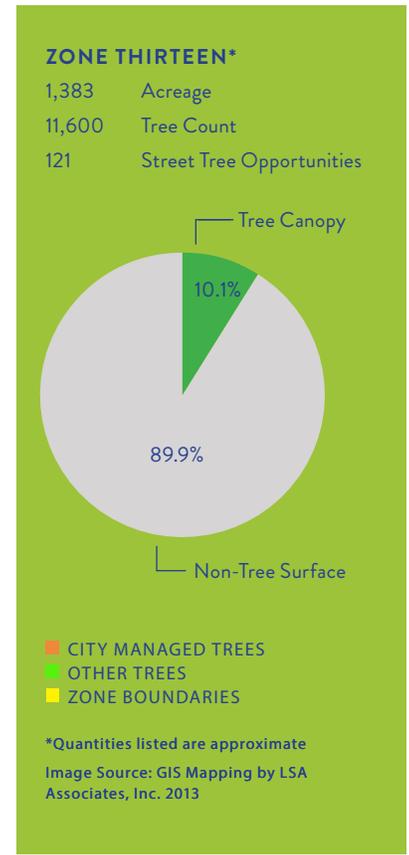
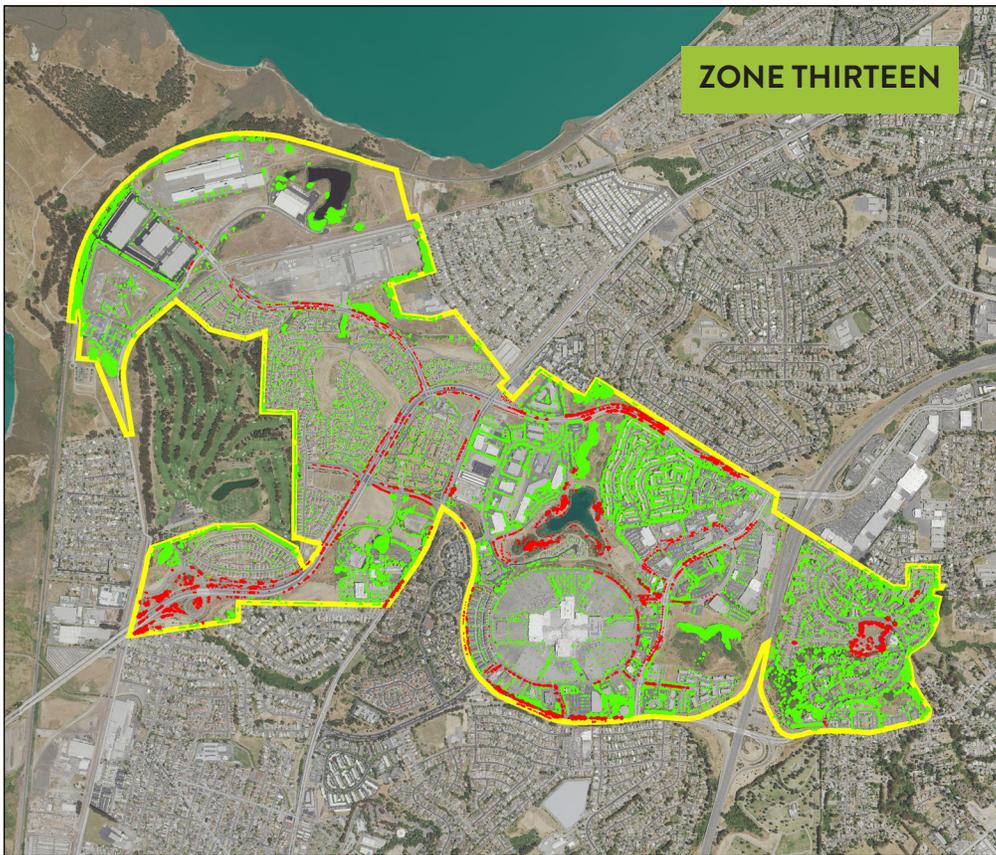
ZONE TWELVE: SAN PABLO PENINSULA

Zone 12 (Figure 3.13) includes areas of the San Pablo Peninsula, a large land mass located west of the City of Richmond. Most of the peninsula is designated as open space or heavy industrial use including a major refinery, regional parks, and recreation facilities. Zone Twelve encompasses Point Molate, a former naval fuel depot, and Point San Pablo.

Zone Twelve covers approximately 374 acres and supports approximately 1,100 trees and approximately 54 acres of other trees with a tree canopy cover of 18.8%.³ The tree canopy in this zone consists primarily of trees in the hillside areas in the central areas of the peninsula. City-owned trees are scattered throughout this zone, with a concentration of trees along Western Drive, north of Interstate 580.

The five most prevalent tree species in this zone include blue gum eucalyptus (*Eucalyptus globulus*), Monterey pine (*Pinus radiata*), coast live oak (*Quercus agrifolia*), California laurel (*Umbellularia californica*), and black locust (*Robinia pseudoacacia*). Approximately 87 percent of the trees in this zone are between 3 and 24 inches in diameter. No street tree opportunities were identified in this zone.

³ Due to the amount of undeveloped open space in this zone and the density of trees in these open space areas, it was infeasible to map individual trees in the open space areas. Instead, aerial photography was used to map groves of trees in these areas.



ZONE THIRTEEN: NORTH RICHMOND NEIGHBORHOODS

Zone Thirteen (Figure 3.14) encompasses northern Richmond, including the neighborhood of Hilltop Bayview. It is bound to the south by Hilltop Drive, to the west by the Union Pacific Railroad tracks/Giant Highway, and to the north and east by the Richmond city limits. This zone contains a variety of uses including residential (low and high density), mixed use, commercial, business, and industrial.

This zone covers approximately 1,383 acres and supports approximately 2,600 City-owned trees and over 9,000 other trees with a tree canopy cover of 10.1%. City-owned trees are concentrated along the Richmond Parkway, Hilltop Drive, Blume Drive, and Atlas Road and within Hilltop Lake Park and Hilltop Green Park. Other trees are scattered throughout this zone with concentrations in undeveloped open space areas between developments and along the Point Pinole Regional Shoreline. The five most prevalent tree species in this zone include blackwood acacia (*Acacia melanoxylon*), London planetree (*Platanus x acerifolia*), coast live oak (*Quercus agrifolia*), Callery pear (*Pyrus calleryana*), and Italian stone pine (*Pinus pinea*).

Approximately 75% of the trees in this zone are less than 12 inches in diameter. The tree survey identified only 121 street tree opportunity sites of varying sizes in this zone. These opportunity sites are primarily located along the Richmond Parkway and Parkridge Drive.

ABOVE

Figure 3.14
Zone 13 Analysis Map

3.04 EXISTING CONDITIONS AND CHALLENGES

This section describes the history of Richmond’s urban landscape, summarizes existing initiatives for promoting the urban forest, and evaluates the conditions of the existing urban forest based on several factors, including extent of tree canopy, species diversity, age, and health of the trees.

A BRIEF HISTORY OF RICHMOND’S URBAN LANDSCAPE

In 1900, when the transcontinental Santa Fe Railroad arrived at Point Richmond, speculative real estate development began to shape the city’s landscape. Beginning along the waterfront, harbors were dredged and marshlands filled. A large-scale shipping port terminal was constructed during this time and the Richmond-San Rafael Ferry and Transportation Company and other industries including American Radiator, Pullman Palace Car Shops, Standard Oil, Standard Sanitary Company, Stauffer Chemical Company, Winehaven, Felice & Perelli Cannery and Ford Motor Assembly Plant were established near Richmond’s shoreline.



—
ABOVE

City of Richmond c. 1950

*Image Courtesy of the
Richmond History Museum.*

As early as the 1920s, Richmond planted trees along gravel roads traveled primarily by horse-drawn vehicles. A review of period photos and publications from the collection of the Richmond History Museum indicates that street and public tree planting continued in a limited way into the 1940s. Tree planting programs were suspended during World War II, but resumed in the postwar period, typically in conjunction with street and road improvement projects.

During the 1960s the Parks and Recreation Commission secured funds for roadside beautification and through property and sales tax measures. The passage of Proposition 13 in 1978 changed the way the state, county and city administrators prioritized services and public works. In the years that followed, tree planting and park maintenance

in the City of Richmond were often given lower priority. Over the past thirty years, the City has undertaken numerous small-scale tree planting projects, often in association with community or neighborhood groups. Larger scale plantings were initiated as a part of the construction of the Richmond Parkway in the 1990s with major renovations of Cutting Boulevard and Macdonald and San Pablo Avenues since the year 2000.

Richmond’s industrial history is clearly visible in the city’s built environment, which includes a commercial port, a major oil refinery, and regionally significant freeways, Bay Area Rapid Transit (BART) and rail arterials. Approximately 25% of Richmond residents live within the impact area of an industrial operation or within 500 feet of a freeway or truck route. It is estimated that less than 13% of the land in Richmond has significant tree canopy.⁴

TODAY AND TO COME

To determine how Richmond’s urban forest should grow, a formal, field inventory was conducted to evaluate all of the existing City-owned trees and to identify opportunities for additional tree

⁴ Calculated from the total acreage of private and public tree canopy cover versus total acreage within the defined City zones.

planting sites. In addition, the extent of other trees within the City (e.g. on private property, in open space areas) was estimated using Geographic Information Systems (GIS). With a clear understanding of the current state of the City’s urban forest, the City can begin to develop strategies to maintain, sustain and expand its urban forest as a counterbalance to the City’s built environment.

Currently the City of Richmond owns and maintains approximately 22,000 City-owned trees, which are located in the City’s parks, civic spaces, curbside planting strips, road medians, and on other City-owned and/or maintained properties. A preliminary survey of City-owned trees revealed observable differences in the distribution of trees across the City. For example, Zones 8, 10, and 11 include fewer than 1,000 City-owned trees while Zones 1, 3, 4, 5, and 6 contain over 2,000 City-owned trees (Figure 3.1).

TREE HEALTH

The tree inventory reveals a small urban forest canopy that is in generally good health. The inventory recorded the condition of each tree in one of seven listed categories adapted from the rating system established by the International Society of Arboriculture. This value represents an average of the condition of both the structure and the crown. The results of this health assessment are provided in this section. As shown in Table 3.1, the majority of the City’s trees are in good/fair health.

CANOPY COVERAGE

The urban tree canopy consists of the layer of leaves, branches, and stems of trees that cover the ground when viewed from above using aerial or satellite imagery. A canopy assessment is an estimate of the total amount of the City shaded by trees. For non-City trees (i.e., those located on private property and in open space areas), the canopy of each tree was digitized into GIS using aerial photography and LIDAR.⁵ The overall canopy coverage was then calculated as a percentage of the total zone acreage. For City-owned trees included in the inventory, a regression formula was used to determine the crown radius based on the diameter at breast height of each tree. The area of each canopy could then be calculated and the overall canopy coverage determined. The resulting data provides an approximation of the urban forest tree canopy including all city-owned, public and private trees occurring within the City limits. This assessment establishes a baseline for tracking gains and losses in the urban forest and shows potential areas for tree plantings to help prioritize the placement of new trees where they are most needed.

Table 3.1 City Street and Park Tree Health

Tree Condition	Tree estimate	% of Population
Excellent	17	<1%
Very Good	528	2%
Good	11,567	53%
Fair	8,610	39%
Poor	650	3%
Critical	17	<1%
Dead or Dying	584	3%

Source: i-Tree 2012.

Table 3.2 Canopy Cover by Zone

zone	Tree Canopy City-owned	Tree Canopy other Trees	Total Canopy
1	3.7%	5.4%	9.1%
2	4.2%	7.5%	11.7%
3	2.7%	2.5%	5.2%
4	2.4%	3.4%	5.8%
5	3.1%	3.6%	6.7%
6	4.5%	6.1%	10.7%
7	2.6%	13.5%	16.1%
8	0.3%	28.0%	28.3%
9	1.9%	6.7%	8.6%
10	0.3%	5.1%	5.3%
11	1.4%	5.7%	7.2%
12	5.4%	13.4%	18.8%
13	1.5%	8.6%	10.1%
Total	2.1%	10.6%	12.7%*

Source: LSA Associates, Inc. 2013

*Totals calculated based on area of zones.

⁵ LIDAR is a remote sensing technology that measures distance by illuminating a target with a laser and analyzing reflected light. It is used to make high resolution maps. LIDAR data from the National Oceanic and Atmospheric Association (2011) and Contra Costa County (2008) was used to estimate the height of features in the aerial photographs.

As of 2012-2013, the tree canopy cover in the City of Richmond was estimated at 12.7%. In 2004, the national average for urban canopy in the United States was 27.1%⁶. While the American Forests Organization recommends an average of 40%⁷ tree canopy coverage in areas East of the Mississippi, the recommended urban tree canopy for the Southwest and dry West, which includes Richmond, is between 25% to 35% depending on the type of development. San Francisco has a tree canopy cover of 13.7%, one of the smallest tree canopies of major cities in the United States. The tree canopy cover in Richmond is not only below the national average but also below the tree canopy cover of other major cities in California, adding to the importance of implementing this Urban Greening Master Plan (UGMP).

Table 3.2 shows the distribution of tree canopy over the City's 13 zones. As shown, Zones 3, 4, and 10 have the lowest tree canopy cover in the City (less than 6% of total land area). These areas contain rail yards, industrial development, and/or Port-related uses, all of which preclude the widespread planting of trees. The UGMP strives to protect the tree canopy where it is high and expand the tree canopy in specific areas of the City where it is low.

RICHMOND TREE CANOPY TARGET

Through the implementation of the UGMP, the City anticipates reaching a 15% tree canopy cover by 2020. Although the majority of trees in Richmond are young, the City has a healthy urban forest and a current tree canopy cover of 12.7%. This UGMP presents an opportunity for Richmond to increase canopy cover by adopting proper practices for urban forest care, so these young trees can have longer and healthier lives in the long-run. Through the implementation of the Urban Greening Master Plan, the City of Richmond aims to double its urban tree canopy by 2030.

Reaching a 22% canopy cover from publically-owned trees will place Richmond closer to the recommended canopy target based on its climate zone and urban conditions. The City aims to do so by prioritizing the zones with the lowest tree canopy and by taking full advantage of the opportunity tree planting sites identified as part of the tree inventory. The Parks and Landscaping Division has finalized and updated a list of approved street trees and vegetation to be integrated into the UGMP. The selection of species takes into account important factors for urban environments such as pollution exposure, temperature, wind conditions, soil characteristics (including soil types and pH), shading capacity, tree life expectancy, water consumption and stormwater run-off. These factors help estimate some of the desired economic and environmental benefits including improved health and air quality, carbon dioxide reductions and storm water management that will result from greening Richmond (Appendix A). The intent of the street tree list is to act as a living document that may be amended as needed to fully implement the goals of this plan. The UGMP allows such flexibility for modifications to the list over time.

By setting a tree canopy cover target, Richmond will advance its urban greening goals in the short-term (2020) and long-term (2030) to be in compliance with other planning initiatives of the city, as mentioned in Section 3.01 of the plan. The Climate Action Plan (CAP) estimated annual GHG

⁶ <http://www.nrs.fs.fed.us/nyc/local-resources/downloads/MillionTreesWorkshopReport.pdf>

⁷ According to American Forest Organization, 40% of tree cover in cities will ensure the sustainability of the urban forest and maximize community benefits from trees. (American Forest <http://www.americanforests.org/>)

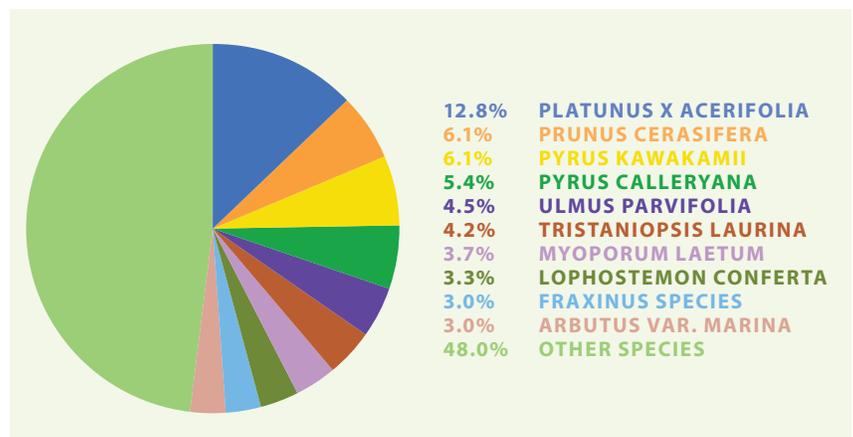
reductions associated with urban greening of 375 metric tons of CO2 equivalents (CO2e) by 2020 and of 1,081 metric tons of CO2e by 2030. Additionally, CAP estimated energy savings based on the assumption that 5% of households will plant a shade tree by 2020 and 10% by 2030. Emission reductions associated with urban forest sequestration and with local food and local agriculture are not included in the CAP but were calculated at 22.5 metric tons reduction by 2020 and 81 metric tons reduction by 2030, based on studies from Los Angeles, California and Gainesville, Florida.

In order to adopt a feasible model to increase the city’s tree canopy cover, these initial canopy goals reflect a comprehensive analysis of best practices used by eight U.S. cities, half of which were located in California and shared similar characteristics with Richmond. The main considerations for setting these targets included:

- » Richmond’s GHG goals, regional planning efforts and municipal requirements
- » Desirability vs. feasibility by land use/type
- » Availability of public spaces (size and density)
- » Tree health (regeneration, mortality and growth)
- » Urban climate (as recommended by the American Forests Organization)
- » Drought tolerance
- » Wildlife habitat benefits
- » Importance of education and availability of local foods

TREE SPECIES

Richmond’s current street tree inventory includes 139 different genera (subdivisions) and over 270 species with no one genus or species dominant. The five most abundant species of street trees throughout the City include London planetree (*Platanus x acerfolia*), purple-leaf plum (*Prunus cerasifera*), Callery pear (*Pyrus calleryana*), evergreen pear (*Pyrus kawakamii*), and Chinese elm (*Ulmus parvifolia*). Figure 3.15 shows the distribution of tree species identified in the tree inventory.



BELOW

Figure 3.15
Distribution of Tree
Species in the City of
Richmond

Source: Richmond Urban
Forest Inventory 2013

As shown, no one tree genus or species is dominant. Diverse tree composition reduces the risk of major losses to virulent pathogens, such as chestnut blight or Dutch elm disease. The recommended distribution of trees in a City’s urban forest should follow the 10-20-30 Rule,⁸ that is no more than 30% comprised of the same family, no more than 20% comprised of the same genus and no more than 10% comprised of the same species. As shown in Figure 3.15, the composition of the City’s urban forest is generally consistent with the 10-20-30 Rule, with the exception of the London planetree, which exceeds 10%. The number of genera and species that thrive in the City of Richmond allows for increased diversity to safeguard against disease.

NOTE

The 10-20-30 Rule

Source: The first published reference to the 10-20-30 rule was by late Dr. Frank Santamour, Research Geneticist at the US National Arboretum in his paper *Trees for Urban Planting: Diversity, Uniformity, and Common Sense*, which was presented at the 1990 Metropolitan Tree Improvement Alliance (METRIA) conference.

8 10-20-30 Rule: The first published reference to the 10-20-30 rule (often referred to as just the 10% rule) was by late Dr. Frank Santamour, Research Geneticist at the US National Arboretum in his paper *Trees for Urban Planting: Diversity, Uniformity, and Common Sense*, which was presented at the 1990 Metropolitan Tree Improvement Alliance (METRIA) conference.

BELOW

Figure 3.16
Tree Heights in the City
of Richmond

Source: Richmond Urban
Forest Inventory 2013

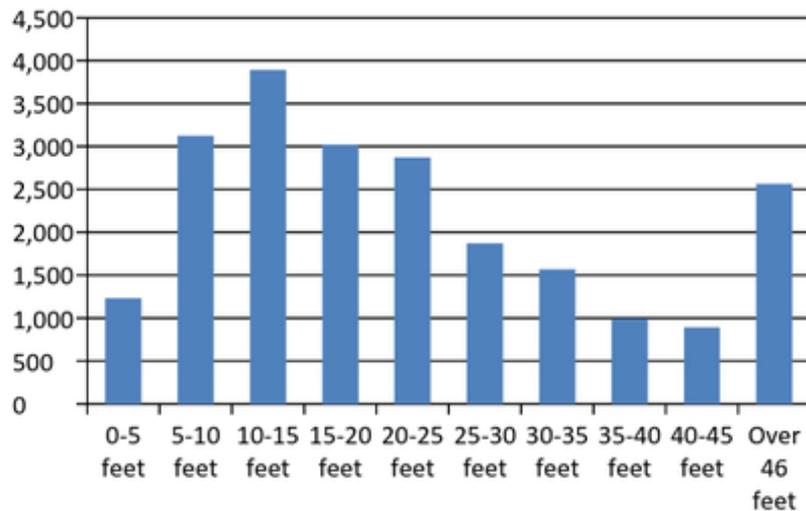


Table 3.3 Grow Space for City-owned Trees

Site Type	Description	Number	Percent
Cutout	Grass, mulched, or exposed soil in a space smaller than 4 feet before hardscape begins.	3,668	17%
Planting Strip	Grass, mulched, or exposed soil area in a space smaller than 8 feet in the minimum direction before hardscape begins.	9,574	44%
Lawn/Park	Maintained grass areas in a space equal to or greater than 10 feet in the minimum direction or growing within a park.	2,287	10%
Median	A grow space that divides the flow of traffic.	1,470	7%
Island	A grow space that divides two roads.	216	1%
Raised Planter	Hardscape retaining wall or curb is greater than 1 foot and root crown is 1 foot or greater above grade of surrounding soil. Tree is elevated above surrounding grade.	43	<1%
Open/Unrestricted	Soil, mulch, ground cover, or decorative grass that will not be mowed in areas greater than 10 feet before hardscape restricts growth.	4,415	20%
Unmaintained Area	Natural habitat area with intentionally unmaintained vegetation, remnant forests, or vacant low showing no evidence of maintenance in the past year.	346	2%

Source: Richmond Urban Forest Inventory 2013.

TREE SIZE

Richmond’s approximately 22,000 trees have a broad range of sizes. Some of the older trees were planted as part of coordinated projects in the 1920s and 1930s and others in the late 1950s and 1960s. Based on the inventory data, nearly 40% of the City’s street trees have diameters (at breast height) of 6 inches or less and are relatively young. Many other trees are larger, with diameters of 6 to 24 inches, yet are young enough to provide benefits for many more years.

As part of the tree inventory, tree height was estimated in 5-foot increments, from 0 to over 46 feet tall. As shown in Figure 3.16, the City of Richmond’s urban forest includes a range of tree heights, with no one size dominant.

SITE CONDITIONS

A number of issues can threaten the viability of Richmond’s street trees. Small tree pits and failure to maintain tree grates or to prune surface roots can cause root/trunk girdling,⁹ shortening the tree’s lifespan. Soil compaction can also stress these trees and damage their roots and trunks. If trees have been planted in substandard planting strips, they can outgrow the planting strip or tree pit. Trees beneath power lines may require topping, which is no longer an acceptable management practice because it causes poorly-attached, quickly-growing sprouts that require frequent pruning and weaken tree structure. The best method is to plant the right-sized tree for the specific site.

The data from the tree inventory indicates that approximately 61% of the City-owned trees surveyed are located in planting strips and cut outs of up to 8 feet in size. Approximately 30% of the City-owned trees are located in lawns,

⁹ Girdling, also called ring barking or ring-barking, is the complete removal of a strip of bark from around the entire circumference of either a branch or trunk of a woody plant. Girdling results in the death of wood tissues above the damage.

parks, and open/unrestricted areas. Table 3.3 shows the distribution of different planting site types throughout the City. Although many of these trees are located near sidewalks/hardscape, 92% are causing very little damage (less than ¾-inch of uplift). Over 79% of the trees surveyed, no overhead utility lines are present above the crown of the tree. According to the tree survey results, 83% of the City’s street and park trees require routine horticultural pruning to correct structural problems or growth patterns, which would eventually obstruct traffic or interfere with utility wires or buildings. As a result of review, approximately 580 trees are recommended for removal or replacement due to hardscape damage, health or structural issues.

OPPORTUNITIES

As part of the tree inventory, surveyors identified street tree planting opportunity sites, such as vacant existing tree wells, stretches of sidewalk with sufficient width to accommodate street trees, empty planters or planters with some vegetation but no trees, and other areas where trees could be planted. Two typical examples of street tree opportunity sites are shown in Figure 3.17 and Figure 3.18. In all, the tree survey identified over 13,000 potential street tree planting sites within the City of Richmond. As shown in Table 3.4, Street Tree Opportunity Sites by Zone, the majority of these opportunities occur in Zones 1, 3, 4 and 6. A parkway is considered city property, yet is maintained by the property owner. When a city plants a tree in a parkway, the property owner is responsible for watering the tree and ensuring its survival and good health. In neighborhoods that are primarily owner-occupied, this ideal can be more easily attained. In areas with absentee landlords or large commercial enterprises, trees are often scarce and may be poorly maintained, contributing to the number of vacancies and potential tree site opportunities.

The City of Richmond owns and maintains approximately 22,000 trees. This component of Richmond’s urban forest includes trees planted along residential and commercial streets as well as trees in parks and other public spaces such as the civic center. The inventory data indicates a disparity in the extent of tree canopy cover across zones, with some zones having less than 6% tree canopy and others having more than 10%. The distribution of City-owned trees is also uneven across zones. The inventory and assessment identified over 13,000 street tree opportunity sites within the public right-of-way. The identification of these opportunity sites will allow the City to increase the urban forest across the City and address distribution inequities by prioritizing new plantings in areas with disproportionately low canopy coverage.

Table 3.4 Street Tree Opportunity Sites By Zone

Zone	Street Tree Opportunities
1	2,660
2	630
3	2,225
4	2,417
5	1,600
6	1,900
7	500
8	105
9	495
10	103
11	331
12	N/A
13	121
Total	12,817

Source: Richmond Urban Forest Inventory 2013.



ABOVE

Figure 3.17: Typical Open/Paved Site Opportunity
These two common conditions are found throughout the City of Richmond; open and paved planting spaces paved with concrete or other impermeable materials.



ABOVE

Figure 3.18: Typical Parkway Strip Site Opportunity
Field survey work revealed miles of unplanted parkway strips. These spaces contain the majority of street tree planting opportunities in public right-of-way.

3.05 QUANTIFYING THE BENEFITS OF RICHMOND'S URBAN FOREST

Careful analysis of Richmond's publicly-owned tree inventory allows for the value of Richmond's urban forest to be quantified and the importance of its expansion to be established. The ability of trees to sequester carbon presents one important example. Currently, industries in Richmond are producing carbon dioxide at a faster rate than Richmond's current urban forest can absorb. By aggressively expanding the urban forest, the City can achieve a greater balance of greenhouse gas emission and absorption. By absorbing emissions and other air toxins, trees can offer particularly important benefits, such as decreased asthma rates and cleaner air.

The data gathered as part of the tree inventory was processed through tree benefit models developed for the region to help determine the costs/benefits for Richmond's urban forest. Benefits estimates were calculated using i-Tree Streets, which estimates the approximate benefits that individual trees provide based on average species growth equations and other geographic parameters specific to a given region. The results of these benefit analyses are described in this section.

CARBON DIOXIDE SEQUESTRATION

As described in Chapter 2, one of the many environmental benefits of the urban forest is its ability to capture and store carbon dioxide from the atmosphere, thereby reducing greenhouse gas emissions that contribute to global warming. Table 3.5: Annual Carbon Dioxide Benefits by Species, shows the annual carbon dioxide benefits provided by City-owned trees in each zone of the City. Carbon dioxide sequestration values were derived from species-based biomass equations.¹⁰ Avoided values

BELOW

Table 3.5
Carbon Dioxide Benefits
by Species

Species	Sequestered (lb)	Sequestered (\$)	Decomposition Release (lb)	Maintenance Release (lb)	Total Released (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
London planetree	402,245	1,327	-22,205	-15,102	-123	116,215	384	481,153	1,588(N/A)		7.4	11.6	0.99
Callery pear	124,917	412	-4,765	-9,162	-46	64,281	212	175,270	578(N/A)		6.5	4.2	0.41
Blue gum eucalyptus	442,443	1,460	-39,298	-17,436	-187	169,432	559	555,141	1,832(N/A)		5.3	13.4	1.61
Coastal live oak; Califor	100,885	333	-4,310	-4,577	-29	30,500	101	122,498	404(N/A)		3.7	3.0	0.50
Chinese elm	249,087	822	-14,446	-8,860	-77	76,029	251	301,810	996(N/A)		3.3	7.3	1.39
Brisbane box	104,323	344	-3,530	-4,617	-27	29,814	98	125,989	416(N/A)		3.1	3.0	0.61
Water gum; kanooka	67,377	222	-1,771	-3,195	-16	17,421	57	79,832	263(N/A)		3.0	1.9	0.41
Coast redwood	49,206	162	-2,312	-4,245	-22	33,216	110	75,865	250(N/A)		2.9	1.8	0.40
Monterey pine	126,517	418	-10,739	-9,187	-66	84,671	279	191,261	631(N/A)		2.6	4.6	1.14
Southern magnolia	102,631	339	-5,706	-618	-21	42,640	141	138,947	459(N/A)		2.4	3.4	0.87
Chinese pistache	17,464	58	-502	-1,718	-7	8,339	28	23,584	78(N/A)		2.4	0.6	0.15
Black acacia	64,814	214	-4,952	-4,577	-31	30,812	102	86,097	284(N/A)		2.4	2.1	0.56
Red maple	15,246	50	-280	-1,198	-5	6,736	22	20,505	68(N/A)		2.0	0.5	0.16
Laurel de olor	16,260	54	-348	-474	-3	6,659	22	22,097	73(N/A)		1.9	0.5	0.18
Raywood ash	73,405	242	-3,236	-3,194	-21	23,859	79	90,834	300(N/A)		1.9	2.2	0.75
Cherry plum	27,847	92	-846	-467	-4	10,353	34	36,886	122(N/A)		1.8	0.9	0.31
Common crapemyrtle	11,493	38	-251	-753	-3	1,814	6	12,303	41(N/A)		1.8	0.3	0.11
Sweetgum	73,715	243	-4,081	-3,888	-26	35,679	118	101,425	335(N/A)		1.8	2.4	0.87
Camphor tree	148,149	489	-11,986	-5,804	-59	57,640	190	187,999	620(N/A)		1.7	4.5	1.68
Strawberry tree	14,459	48	-341	-379	-2	6,133	20	19,872	66(N/A)		1.5	0.5	0.20
Purpleleaf plum	13,155	43	-404	-1,185	-5	6,545	22	18,111	60(N/A)		1.3	0.4	0.21
Mioporo	36,467	120	-3,918	-2,987	-23	21,869	72	51,431	170(N/A)		1.2	1.2	0.64
Italian stone pine	33,520	111	-901	-310	-4	2,638	9	34,947	115(N/A)		1.2	0.8	0.44
Gum	70,430	232	-4,910	-2,862	-26	25,383	84	88,041	291(N/A)		1.2	2.1	1.15
Cajeput tree	22,562	74	-4,574	-3,010	-25	23,934	79	38,912	128(N/A)		1.1	0.9	0.55
OTHER STREET TREI	816,293	2,694	-42,991	-39,463	-272	334,718	1,105	1,068,557	3,526(N/A)		34.7	25.8	0.47
Citywide total	3,224,910	10,642	-193,604	-149,269	-1,131	1,267,331	4,182	4,149,368	13,693(N/A)		100.0	100.0	0.63

¹⁰ Mathematical functions that relate biomass in the above-ground portion of the tree (including the stump, top branches and leaves) per tree as a function of a single or combination of tree dimensions based on existing forest inventory data.

were estimated by converting the savings to pounds of avoided carbon emissions and assigning a dollar value to these avoided carbon emissions. The carbon dioxide value is based on an estimate of the social cost of carbon as calculated by the 2010 Interagency Working Group on Social Cost of Carbon for the United States Government.¹¹

According to the Richmond General Plan 2030, in Richmond’s industries, businesses and residents generated over 5.8 million metric tons of carbon dioxide equivalents (CO2e) in 2005. The 2020 emissions forecast, completed as part of the greenhouse gas emissions inventory, suggests that with no interventions, emissions will grow significantly in the commercial/industrial, and transportation sectors over the next decade. This increase is forecast to be approximately 30 percent, or an additional 1.8 million metric tons of CO2e.¹²

As shown in Table 3.5, the City’s existing urban forest successfully sequesters approximately 3,224,910 pounds (1,462 metric tons) of CO2 per year, which equates to approximately 1,267,331 pounds (574 tons) of avoided carbon emissions annually. Clearly, expanding the City’s urban forest will help the City mitigate the impacts of climate change.

AIR QUALITY BENEFITS

Trees deliver air quality benefits by the cooling effect of their shade and by removing certain pollutants. By cooling, trees reduce evaporative emissions from vehicles and other fuel storage. By cooling homes and offices, trees reduce power generation emissions. General cooling also reduces the speed of chemical reactions that lead to the formation of ozone and particulate matter.

BELOW

Table 3.6
Air Quality Benefits by
Species

Species	Deposition (lb)				Total Depos. (\$)	Avoided (lb)				Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)	Total (\$)	Standard Error	% of Total	Avg. Trees \$/tree
	O ₃	NO ₂	PM ₁₀	SO ₂		NO ₂	PM ₁₀	VOC	SO ₂								
London planetree	305.6	100.7	138.6	23.6	658	1,645.0	43.1	40.4	256.1	2,114	-259.4	-91	2,293.6	2,681 (N/A)	7.4	1.67	
Callery pear	167.3	55.1	75.1	12.6	358	910.0	23.8	22.4	141.6	1,169	-1,350.2	-473	57.6	1,055 (N/A)	6.5	0.75	
Blue gum eucalyptus	804.5	255.5	523.4	75.3	2,012	2,389.5	62.2	58.4	373.3	3,072	-3,696.9	-1,294	845.3	3,790 (N/A)	5.3	3.33	
Coastal live oak; Californi:	127.8	40.6	83.1	12.0	320	430.6	11.2	10.5	67.2	554	-811.7	-284	-28.6	589 (N/A)	3.7	0.73	
Chinese elm	199.6	65.8	90.5	15.4	430	1,076.5	28.2	26.4	167.5	1,383	-173.0	-61	1,497.0	1,752 (N/A)	3.3	2.44	
Brisbane box	120.5	38.3	78.4	11.3	301	421.3	11.0	10.3	65.7	541	-841.9	-295	-85.1	548 (N/A)	3.1	0.81	
Water gum; kanooka	69.5	22.1	45.2	6.5	174	246.0	6.4	6.0	38.4	316	-530.5	-186	-90.5	304 (N/A)	3.0	0.47	
Coast redwood	118.4	37.6	77.1	11.1	296	466.9	12.1	11.4	73.2	601	-484.6	-170	323.2	727 (N/A)	2.9	1.17	
Monterey pine	329.2	104.6	214.2	30.8	823	1,192.8	31.0	29.1	186.5	1,534	-1,541.3	-539	577.0	1,818 (N/A)	2.6	3.28	
Southern magnolia	182.3	57.9	118.6	17.1	456	603.1	15.8	14.8	94.0	775	0.0	0	1,103.6	1,231 (N/A)	2.4	2.33	
Chinese pistache	21.7	7.1	9.7	1.6	46	118.1	3.1	2.9	18.4	152	-171.4	-60	11.2	138 (N/A)	2.4	0.26	
Black acacia	113.1	35.9	73.6	10.6	283	432.8	11.2	10.5	67.9	557	0.0	0	755.7	840 (N/A)	2.4	1.64	
Red maple	18.6	6.1	8.4	1.4	40	96.0	2.5	2.4	14.8	123	-12.7	-4	137.6	159 (N/A)	2.0	0.37	
Laurel de olor	28.4	9.0	18.5	2.7	71	94.5	2.5	2.3	14.7	121	0.0	0	172.6	192 (N/A)	1.9	0.48	
Raywood ash	58.1	19.1	26.1	4.4	124	335.2	8.7	8.2	52.6	431	0.0	0	512.3	556 (N/A)	1.9	1.39	
Cherry plum	29.9	9.9	13.6	2.3	64	146.3	3.8	3.6	22.8	188	-0.6	0	231.5	252 (N/A)	1.8	0.63	
Common crapemyrtle	5.5	1.8	2.4	0.4	12	25.8	0.7	0.6	4.0	33	-0.1	0	41.1	45 (N/A)	1.8	0.12	
Sweetgum	96.4	31.7	43.3	7.3	206	504.8	13.2	12.4	78.6	649	-783.2	-274	4.4	581 (N/A)	1.8	1.52	
Camphor tree	266.9	84.8	173.6	25.0	668	813.7	21.2	19.9	127.0	1,046	-1,245.7	-436	286.5	1,278 (N/A)	1.7	3.46	
Strawberry tree	26.3	8.3	17.1	2.5	66	87.0	2.3	2.1	13.5	112	0.0	0	159.1	177 (N/A)	1.5	0.55	
Purpleleaf plum	16.8	5.5	7.6	1.3	36	92.6	2.4	2.3	14.4	119	-134.3	-47	8.7	108 (N/A)	1.3	0.38	
Mioporo	81.7	26.0	53.2	7.7	204	307.1	7.9	7.5	48.2	395	0.0	0	539.3	600 (N/A)	1.2	2.25	
Italian stone pine	6.9	2.2	4.5	0.6	17	36.5	0.9	0.9	5.8	47	-12.5	-4	45.7	60 (N/A)	1.2	0.23	
Gum	114.5	36.3	74.5	10.7	286	358.3	9.3	8.8	55.9	461	-585.5	-205	82.8	542 (N/A)	1.2	2.14	
Cajeput tree	89.7	28.5	58.4	8.4	224	336.0	8.7	8.2	52.7	432	0.0	0	590.6	657 (N/A)	1.1	2.83	
OTHER STREET TREES	1,179.4	378.9	690.8	103.6	2,813	4,729.4	123.5	115.9	737.5	6,079	-3,292.0	-1,152	4,767.2	7,740 (N/A)	34.7	1.03	
Citywide total	4,578.6	1,469.3	2,719.3	406.1	10,990	17,895.6	466.9	438.3	2,792.4	23,005	-15,927.3	-5,575	14,839.3	28,420 (N/A)	100.0	1.31	

11 i-Tree Design website. Available online at: http://www.itreetools.org/tree_calculator/calc_map/map_index.cfm Accessed 12 December 2013.

12 Richmond General Plan 2030

Leaves and needles have surface area that can allow for removal (deposition) of ozone, nitrogen, dioxide, and to a lesser extent particulate matter. Some particles can be absorbed into the tree, though most particles that are intercepted are retained on the plant surface. The intercepted particle often is resuspended to the atmosphere, washed off by rain or dropped to the ground with leaf and twig fall. Consequently, vegetation is only a temporary retention site for many atmospheric particles. Air quality improves with increased percent tree cover and decreased mixing-layer heights. In urban areas with 100% tree cover (e.g., contiguous tree stands), short-term improvements in air quality (one hour) from pollutant removal by trees were as high as 15% for ozone, 14% for sulfur dioxide, 13% for particular matter, 8% for nitrogen dioxide, and 0.05% for carbon monoxide.¹³

Table 3.6, Annual Air Quality Benefits by Species, shows the annual air quality benefits provided by different species of trees throughout the City. As shown in Table 3.6, the City's existing urban forest removes approximately 15,000 pounds of pollutants each year.

STORM WATER CAPTURE

Trees and forests improve stream quality and watershed health primarily by decreasing the amount of storm water runoff and pollutants that enter local waters. Trees reduce storm water runoff by capturing and storing rainfall in the canopy and releasing water into the atmosphere through evapotranspiration. In addition, tree roots and leaf litter create soil conditions that promote the infiltration of rainwater into the soil.

Table 3.7, Annual Storm Water Benefits by Zone, shows the total rainfall interception (in gallons) for all City-owned trees in each zone. As shown the City's existing urban forest intercepts approximately 14 million gallons of rainfall per year, which translates into a total savings of approximately \$400,000

RIGHT
Table 3.7
Storm Water Benefits by
Species

Species	Total rainfall interception (Gal)	Total Standard (\$)	Error	% of Total Trees	% of Total \$	Avg. \$/tree
London planetree	1,167,830	32,351	(N/A)	7.4	8.1	20.16
Callery pear	622,276	17,238	(N/A)	6.5	4.3	12.23
Blue gum eucalyptus	2,092,187	57,958	(N/A)	5.3	14.5	50.93
Coastal live oak; California	409,707	11,350	(N/A)	3.7	2.9	14.03
Chinese elm	773,506	21,428	(N/A)	3.3	5.4	29.84
Brisbane box	413,116	11,444	(N/A)	3.1	2.9	16.88
Water gum; kanooka	253,167	7,013	(N/A)	3.0	1.8	10.82
Coast redwood	463,599	12,843	(N/A)	2.9	3.2	20.68
Monterey pine	1,426,182	39,508	(N/A)	2.6	9.9	71.19
Southern magnolia	439,235	12,168	(N/A)	2.4	3.1	23.04
Chinese pistache	79,473	2,202	(N/A)	2.4	0.6	4.18
Black acacia	193,963	5,373	(N/A)	2.4	1.4	10.51
Red maple	61,114	1,693	(N/A)	2.0	0.4	3.92
Laurel de olor	82,526	2,286	(N/A)	1.9	0.6	5.64
Raywood ash	234,267	6,490	(N/A)	1.9	1.6	16.18
Cherry plum	91,339	2,530	(N/A)	1.8	0.6	6.34
Common crapemyrtle	11,057	306	(N/A)	1.8	0.1	0.80
Sweetgum	361,198	10,006	(N/A)	1.8	2.5	26.12
Camphor tree	701,957	19,446	(N/A)	1.7	4.9	52.70
Strawberry tree	73,396	2,033	(N/A)	1.5	0.5	6.28
Purpleleaf plum	62,096	1,720	(N/A)	1.3	0.4	6.06
Mioporo	153,236	4,245	(N/A)	1.2	1.1	15.90
Italian stone pine	41,646	1,154	(N/A)	1.2	0.3	4.35
Gum	318,556	8,825	(N/A)	1.2	2.2	34.88
Cajeput tree	178,766	4,952	(N/A)	1.1	1.2	21.35
OTHER STREET TREES	3,694,172	102,336	(N/A)	34.7	25.7	13.61
Citywide total	14,399,566	398,896	(N/A)	100.0	100.0	18.41

13 Nowak, David J. 2002. The Effects of Urban Trees on Air Quality. USDA Forest Service, Syracuse, New York. Available online at: http://www.nrs.fs.fed.us/units/urban/local-resources/downloads/Tree_Air_Qual.pdf Accessed on December 18, 2013.

annually or \$18 per tree. By capturing rainfall, these trees reduce the total volume of runoff entering the City's storm drain system and ultimately water runoff to the Bay.

AESTHETIC AND OTHER BENEFITS

Trees add beauty to their surroundings by adding color to an area, softening harsh lines of buildings, screening unsightly views and contributing to the character of their environment. Trees also help to conserve energy by lowering temperatures and shading buildings during the summer and blocking winds during the winter.

Table 3.8, Annual Aesthetic and Other Benefits by Species, assigns a dollar value to these community benefits to better understand the advantages of maintaining and expanding the City's urban forest. As shown, the City's urban forest generates approximately \$870,000 annually in aesthetic and other benefits or approximately \$40 per tree.

GROUNDWATER RECHARGE BENEFIT

Urban greening, including green infrastructure, can help restore rainwater infiltration by recharging local aquifers and surface groundwater.¹⁴ Recharging groundwater is an important ecological service to sustain human activity including uses such as drinking water and irrigation for greenery. Maximizing this groundwater recharge benefit can improve watershed health of and rebalance aquifer discharges, which over time can present long-lasting environmental and economic consequences in cities. Green infrastructure allows for the re-use of infiltrated water for human use, and for discharges back to surface waters. This is a cost-effective practice to manage groundwater sustainably, and to expand California's limited water supply/storage capacity for future changing environmental conditions. Added benefits of groundwater recharge include local control of

Species	Total (\$)	Standard Error	% of Total Trees	% of Total \$	Avg. \$/tree
London planetree	101,812	(N/A)	7.4	11.8	63.43
Callery pear	69,881	(N/A)	6.5	8.1	49.60
Blue gum eucalyptus	48,284	(N/A)	5.3	5.6	42.43
Coastal live oak; Californic	29,651	(N/A)	3.7	3.4	36.65
Chinese elm	56,942	(N/A)	3.3	6.6	79.31
Brisbane box	28,586	(N/A)	3.1	3.3	42.16
Water gum; kanooka	24,620	(N/A)	3.0	2.8	37.99
Coast redwood	33,618	(N/A)	2.9	3.9	54.14
Monterey pine	48,814	(N/A)	2.6	5.6	87.95
Southern magnolia	14,308	(N/A)	2.4	1.7	27.10
Chinese pistache	13,900	(N/A)	2.4	1.6	26.38
Black acacia	6,577	(N/A)	2.4	0.8	12.87
Red maple	14,680	(N/A)	2.0	1.7	33.98
Laurel de olor	9,124	(N/A)	1.9	1.1	22.53
Raywood ash	25,183	(N/A)	1.9	2.9	62.80
Cherry plum	12,159	(N/A)	1.8	1.4	30.47
Common crapemyrtle	1,839	(N/A)	1.8	0.2	4.80
Sweetgum	25,349	(N/A)	1.8	2.9	66.19
Camphor tree	15,298	(N/A)	1.7	1.8	41.46
Strawberry tree	7,327	(N/A)	1.5	0.9	22.61
Purpleleaf plum	9,465	(N/A)	1.3	1.1	33.33
Mioporo	3,913	(N/A)	1.2	0.5	14.66
Italian stone pine	4,427	(N/A)	1.2	0.5	16.71
Gum	10,623	(N/A)	1.2	1.2	41.99
Cajeput tree	2,483	(N/A)	1.1	0.3	10.70
OTHER STREET TREES	246,710	(N/A)	34.7	28.5	32.82
Citywide total	865,573	(N/A)	100.0	100.0	39.96

LEFT

Table 3.8
Aesthetic and Other
Benefits by Species

14 Center for Neighborhood Technologies & American Rivers. (2010). The Value of Green Infrastructure: A Guide to Recognizing Its Economic, Environmental and Social Benefits. http://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf

distribution and costs in the state, less water loss, reduced energy use, and restoring ecosystems.¹⁵ The groundwater recharge benefit is in alignment with the 2014 Sustainable Groundwater Management Act (SGMA), which allows local agencies to customize groundwater sustainability plans to meet local and regional environmental and economic needs.¹⁶ SGMA is overseen by the California Department of Water Resources.

COST-BENEFIT ANALYSIS

The City of Richmond’s urban forest provides significant environmental services and benefits to the community. The recently completed street tree inventory allows for those benefits to be quantified and modeled for that portion of the forest. The i-Tree software suite published by the United States Department of Agriculture (USDA) was used to model the environmental service benefits provide by city-owned trees in Richmond. The software enabled the production of detailed breakdowns by tree species of some of the primary environmental service benefits; air quality, carbon capture, storm water interception, and aesthetic, and other benefits. Tables illustrating these benefits are included in this report.

Beyond the shade and beauty that they provide to Richmond’s residents, the trees in the urban forest have real and demonstrable monetary value. Each of the analysis tables referenced earlier includes a column listing the average dollar value of the environmental service or benefit provided. The models for determining these values are based on regional averages also developed by the USDA. These models, which reflect differences between tree species and also on trees based on state of maturity, are imbedded in the analysis software.

The average environmental service benefit value for a city-owned street tree was found to be just over \$60. This figure when multiplied by the number of city-owned trees generates an estimated annual value of the environmental services provided by Richmond’s public trees of roughly \$1,360,000.00. This is a significant asset and the recurring nature of these environmental benefits means that over time the value generated by Richmond’s city-owned trees will continue to accumulate.

Expansion of this green infrastructure component through investment in street tree planting programs will help the value of this accumulate and increase more quickly. As with any investment, there are costs that need to be accounted for in order to determine the actual asset value.

Table 3.9 is a cost benefit analysis calculation that compares the environmental service benefits provided by Richmond’s city-owned trees with the expense of planting and maintaining those trees. Cost benefit analysis confirms that the investment in street trees yields significant economic benefits in the form of valuable environmental services.

RIGHT
Table 3.9
Aesthetic and Other
Benefits by Species

15 Rohde, M., Choy, J. & McGhee, G. Recharge: Groundwater’s Second Act. <http://waterinthewest.stanford.edu/groundwater/recharge/>
16 <http://www.water.ca.gov/cagroundwater/legislation.cfm>



CALCULATING THE BENEFITS OF CITY-OWNED TREES

When calculating the net benefits provided by city-owned trees in Richmond's urban forest it is important to keep in mind the idea that the environmental services and valuable benefits provided are realized on a variety of levels. The environmental services provided by the urban forest benefit individuals on a personal level, increasing property values and improving the immediate area for individual health. These benefits are expanded to a neighborhood level where residents enjoy a greater sense of well being as a result of improved neighborhood attractiveness. On a community scale the environmental benefits may include reduced levels of crime as well as greater public safety and reduction of storm water run off to public infrastructure (storm drains). Extrapolated to a regional, or even global level, the environmental service benefits include the reduction of atmospheric CO₂ levels an important component for the mitigation of global warming.

The following calculations examine the environmental services provided by city-owned trees through the lens of economic cost/benefit analysis.

Note: The accrued benefit values shown on this table were determined by analysis of data from the street tree inventory recently completed by the City of Richmond by means of the iTree software suite. The maintenance costs indicated are figures provided by the City's Parks and Landscaping Division.

Formula for Calculation of Annual Benefits		BENEFITS = E + AQ + CO ₂ + H + A
E = Annual Value of Net Energy Savings - Chart in Appendix A of Urban Greening Master Plan		\$53,406.00
AQ = Annual Value of Air Quality Benefits - Chart in Appendix A of Urban Greening Master Plan		\$28,420.00
CO ₂ = Annual CO ₂ Capture Benefits - Chart in Appendix A of Urban Greening Master Plan		\$13,693.00
H = Annual Storm Water Benefits - Chart in Appendix A of Urban Greening Master Plan		\$398,896.00
A = Annual Aesthetic Benefits of Public Trees- Chart in Appendix A of Urban Greening Master Plan		\$865,573.00
Cumulative Annual Benefits		\$1,359,988.00

Formula for Calculation of Annual Costs		COSTS = P + T + R + D + I + S + CL + A
P = Annual Cost for Tree Planting (unit cost x # of trees planted)		
\$155.00 x 500 =		\$77,500.00
T = Annual Cost for Tree Pruning (unit cost x # of trees pruned by size)		
\$15.00 x 90 =	Cost for annual pruning of young trees	\$1,350.00
\$20.00 x 178 =	Cost for annual pruning of trees < 20' tall	\$3,560.00
\$60.00 x 267 =	Cost for annual pruning of medium trees	\$16,020.00
\$180.00 x 355 =	Cost for annual pruning of large trees	\$63,900.00
R = Annual Cost for Tree/Stump Removal (unit cost x # of trees/stumps removed by size)		
\$16.00 x 9 =	Tree removal - tree under 3" d.b.h.*	\$144.00
\$396.00 x 51 =	Tree removal - 3"-8" d.b.h.	\$20,196.00
\$594.00 x 68 =	Tree removal - 8"-12" d.b.h.	\$40,392.00
\$792.00 x 43 =	Tree removal - 12"+ d.b.h.	\$34,056.00
D = Annual Pest Control Cost (unit cost x population)		
\$0.16 x 22,000 =		\$3,520.00
I = Annual Irrigation Cost (unit cost x # of trees)		
\$2.00 x 1,500 =	Irrigation of trees by water truck during 5 year establishment period	\$3,000.00
S = Annual to Repair Infrastructure (unit cost x population)		
\$2.23 x 22,000 =	Sidewalk and sewer lateral damage caused by city-owned trees	\$49,060.00
CL = Annual Cost of Litter / Storm Damage Clean Up (unit cost x population)		
\$1.54 x 22,000 =		\$33,880.00
A = Administrative Costs (unit cost x population)		
\$6.41 x 22,000 =		\$141,020.00

*d.b.h. - Diameter at Breast Height

Cumulative Annual Costs		\$487,598.00
--------------------------------	--	---------------------

Formula for Calculation of Net Benefits		BENEFITS - COSTS = NET BENEFITS
Benefits	Costs	
\$1,359,988.00	minus \$487,598.00 =	Annual Net Benefits \$872,390.00

Formula for Calculation of Benefit-to-Cost Ratio (BCR)		BCR = B/C
Benefits	Costs	
\$1,359,988.00	/ \$487,598.00 =	Annual BCR 278.92%

Limitations of Benefit/Cost Model

As is the case with any modeling technique this analysis has limitations and the data put forward should be balanced with other factors when it is used in any planning or decision making process. It is based on the recently completed inventory of city-owned trees. City-owned trees are a significant portion of Richmond's urban forest, but they are only a fractional piece of the total forest within the city limits which functionally includes all trees on privately owned property and on the lands of the East Bay Regional Parks District or West Contra Costa Unified School District.

Attention has been paid to creating a complete accounting of both benefit values and costs, but it is not possible to know all variables necessary to generate a fully comprehensive model. For example, the analysis does not incorporate costs incurred by utility companies and passed on to customers for maintenance of trees under overhead lines.

Estimating aesthetic and other less tangible benefits is difficult because research into these areas is developing and it is difficult to translate into purely economic terms. It is a challenge to accurately price neighborhood beautification, privacy, wildlife habitat, and shade that increases human comfort and well being, however the value of these benefits is certainly reflected in the property values and multiple reports confirm that communities with thriving urban forests enjoy higher property values.



CHAPTER 4

VISION & GOALS

4.01 OVER ARCHING GOALS

The Urban Greening Master Plan puts forth five goals to achieve and support a healthy urban forest in Richmond:

- » **GOAL 1: PROTECT THE URBAN FOREST**
- » **GOAL 2: EXPAND THE URBAN FOREST THROUGH URBAN GREENING INITIATIVES**
- » **GOAL 3: MANAGE AND SUPPORT THE URBAN FOREST AND URBAN GREENING**
- » **GOAL 4: EDUCATE AND PROMOTE STEWARDSHIP OF THE URBAN FOREST**
- » **GOAL 5: FUND THE URBAN FOREST AND URBAN GREENING INITIATIVES**

The following chapter expands upon the goals and provides recommended actions and supporting policies and programs to achieve the goals.

OPPOSITE

View of tree canopy
Image Source:
Vallier Design Associates,
Inc.

GOAL 1: PROTECT THE URBAN FOREST

Protect the existing urban forest¹ from development pressures by striving for a net zero loss of trees, establishing specific protections for significant trees, and designating conservation areas in partnership with environmental agencies. Maintain an inventory of greening projects and sites to inform the identification of priority greening areas, and work with the Urban Forest Advisory Committee to effectively implement the Urban Greening Master Plan.

RECOMMENDED ACTIONS

- » Strengthen the City's existing tree ordinance to achieve a net zero loss of trees through a reasonable replacement ratio and consider adding a section within the ordinance to recognize and protect significant trees.
- » Recognize and establish biological and natural resource protection areas as part of the City's urban forest.

GOAL 2: EXPAND THE URBAN FOREST THROUGH URBAN GREENING INITIATIVES

Expand the urban forest by planting trees, shrubs, grasses and other plants in public spaces, parks, opportunity sites, conservation areas and new projects of all types to actualize the environmental, social and economic benefits of a healthy urban forest. Adopt City-wide standards and practices that support the use of green infrastructure in new development and infrastructure projects. Consider establishing minimum canopy coverage requirements for residential neighborhoods to support an equitable distribution of the economic and health benefits of trees and urban greening, and prioritize planting projects in neighborhoods with low canopy coverage. Achieve the goals of the Urban Greening Master Plan by coordinating greening efforts across City plans as well as with community groups and municipal agencies. Support a diverse plant profile that is suited to soil area and site constraints.

RECOMMENDED ACTIONS

- » Activate a City-wide tree planting program on opportunity sites by supporting and expanding existing tree programs and events.
- » Support urban greening initiatives by citizen action groups while following adopted industry best practices.
- » Follow plant species recommendations and biodiversity requirements for new planting projects, use the Approved Street Tree List (Appendix A), and routinely update to encourage plant selections that are suited to Richmond's environmental conditions.
- » Consider the establishment of development best practices to expand the urban forest through sustainable design.
- » Coordinate green strategies with other City-wide plans to achieve mutual goals.
- » Support urban agriculture through inclusive land use policy.
- » Update the Park and Recreation Dedication Fees Ordinance to require new development and redevelopment projects to pay a fair share of the costs of parkland acquisition and improvement.
- » Consider negotiating with private land owners and State agencies for the establishment of open space and planting area easements.

¹ As defined in Section One of the Urban Greening Master Plan, the urban forest is a complex system of trees and smaller plants, wildlife, associated organisms, soil, water and air in and around the City.

GOAL 3: MANAGE AND SUPPORT THE URBAN FOREST AND URBAN GREENING

Manage the urban forest to ensure its long-term sustainability through City-led maintenance efforts and by fostering community stewardship and supporting urban greening community groups.

RECOMMENDED ACTIONS

- » Partner with community groups for tree planting and maintenance.
- » Maintain and expand the urban forest inventory to reflect the diversity of urban greening projects in Richmond.
- » Support the City's Integrated Pest Management ordinance to foster plant and wildlife diversity.
- » Provide self-service stockpiles of compost and woodchips as a resource for urban greening projects.
- » Practice and promote proper tree care techniques for publicly- and privately-owned trees.
- » Support and encourage use of the City's tool lending library.
- » Support community participation in water conservation programs

GOAL 4: EDUCATE AND PROMOTE STEWARDSHIP OF THE URBAN FOREST

Promote trees as economic and environmental resources for the use, education and enjoyment of current and future generations. Through educational and promotional initiatives, make clear the benefits of trees and urban greening to build community stewardship and support.

RECOMMENDED ACTIONS

- » Explore opportunities to partner with the Urban Forest Advisory Committee to support implementation of the Urban Greening Master Plan.
- » Identify possible economic and workforce development opportunities associated with urban forestry.
- » Support the development of environmental curricula to foster environmental stewardship.
- » Provide recognition to significant trees and green infrastructure enhancements within Richmond.
- » Consider assisting in the development of tree workshops for residents and community members.

GOAL 5: FUND THE URBAN FOREST AND URBAN GREENING INITIATIVES

Seek out and establish funding resources to support the long-term sustainability of the urban forest.

RECOMMENDED ACTIONS

- » Identify funding sources for urban greening projects.
- » Identify funding sources to support the City's Parks and Landscaping Division to care for trees and continue to improve administrative and operational duties in support of the Urban Greening Master Plan including regular audits of the tree database to track progress of urban forest expansion.
- » Incorporate the costs of sustainable landscaping in capital improvement project budgets.
- » Maintain the City's Tree City USA designation.

4.02 SUPPORTING POLICIES AND PROGRAMS

GOAL 1: PROTECT THE URBAN FOREST

Protect the existing urban forest from development pressures by striving for a net zero loss of trees, establishing specific protections for significant trees, and designating conservation areas in partnership with environmental agencies. Maintain an inventory of urban greening projects and sites to inform the identification of priority greening areas, and work with the Urban Forest Advisory Committee to effectively implement the Urban Greening Master Plan.

Policy 1-A: Strengthen the City’s existing tree ordinances to achieve a net zero loss of trees through a reasonable replacement ratio and consider adding a section to recognize and protect significant trees.

The Richmond Municipal Code, Resource Management Overlay District, establishes Planning Commission findings, tree preservation and development design criteria, methods of preserving trees during construction, criteria for tree removal, and tree replacement standards for development in the Hillside Physical Constraint Area, See Appendix B. To extend similar protections and standards for all public and private Richmond trees, similar language could be included in the City’s existing, and more broadly applicable, *Trimming, Pruning, Care, Planting, Removal and Moving of Trees, Shrubs or Plants Ordinance*, See Appendix B. The City shall research effective methods of encouraging and enforcing proper tree care and maintenance standards for all trees in the City of Richmond.

An updated *Trimming, Pruning, Care, Planting, Removal and Moving of Trees, Shrubs or Plants Ordinance* could establish a reasonable City-wide tree replacement ratio or in-lieu fee for tree planting and replacement in new development projects (current regulations apply only to resource management overlay zones) and recommend granting development variances for design that preserves existing trees. In-lieu fees for tree removal could fund future tree planting projects to help achieve a net zero loss of trees in the City. A value for replacement could be determined using the International Society of Arboriculture tree valuation and replacement calculation².

“Significant trees” are currently defined in the Hillside Physical Constraint Area of the Municipal Code; however, the definition could be expanded to include consideration for characteristics such as historical relevance, age, ecological value, aesthetics, and location. An updated *Trimming, Pruning, Care, Planting, Removal and Moving of Trees, Shrubs or Plants Ordinance* could specifically require that the removal of significant trees (1) satisfy the criteria for removal specified in the Resource Management Overlay District and, (2) only occur after seeking advance review and the receipt of a removal permit from the City Arborist and/or Parks Superintendent. Opportunities for review could include variance applications, home improvement exceptions, architectural reviews, site and design reviews, and subdivision reviews with discretion permitted for public safety, utility, and damage concerns.

² The 9th edition of The Guide for Plant Appraisal and the associated Workbook are available from the International Society of Arboriculture (ISA). The regional supplement for California, Species Classification and Group Assignment, is available from the Western Chapter of the ISA

Policy 1-B: Recognize and establish biological and natural resource protection areas as part of the City’s urban forest.

Establish biological and natural resource protection areas within or in close proximity to the City of Richmond and consider adopting open space requirements and/or a biological and natural resource habitat overlay district in the City’s Zoning Ordinance to provide greater protection from future development pressures.

The 2030 General Plan identifies special status plant and wildlife species as well as sensitive areas, primarily along Richmond’s coastline and in the hills, that should be preserved and restored to support the rich biodiversity and ecosystem services provided by wetlands, baylands, marshes, creeks and riparian areas. The Urban Greening Master Plan furthers and supports 2030 General Plan Policy CN1.1, Habitat and Biological Resources Protection and Restoration, by identifying the urban greening opportunities associated with protected natural areas. Collaboration with the California Department of Fish and Wildlife, the San Francisco Bay Regional Water Quality Control Board, the East Bay Regional Park District, Bay Conservation and Development Commission (BCDC), US Army Corps of Engineers and other Federal, state and regional agencies is necessary to identify specific sensitive areas and establish appropriate protection measures. These identified areas could also satisfy the characteristics of Priority Conservation Areas, a component of Plan Bay Area as noted in the 2030 General Plan (Action CN1.B).

GOAL 1 RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department Supporting Departments in Italics	Timeframe
<p>Policy 1-A</p>	<p>Strengthen the City’s existing tree ordinances to achieve a net zero loss of trees and consider adding a section to recognize and protect significant trees.</p> <p>Section 15.04.510 of the Richmond Municipal Code, Resource Management Overlay District, establishes Planning Commission findings, tree preservation and development design criteria, methods of preserving trees during construction, criteria for tree removal, and tree replacement standards for development in the Hillside Physical Constraint Area. To extend similar protections and standards for all public and private Richmond trees, similar language could be included in the City’s existing, and more broadly applicable, Trimming, Pruning, Care, Planting, Removal and Moving of Trees, Shrubs or Plants Ordinance (R.M.C. 10.08). The City will research effective methods of encouraging and enforcing proper tree care and maintenance standards for all trees in the City of Richmond.</p>	<p>Planning Division <i>City Attorney’s Office</i></p>	<p>Short-term</p>
<p>Policy 1-B</p>	<p>Recognize and establish biological and natural resource protection areas as part of the City’s urban forest.</p> <p>Establish biological and natural resource protection areas within or in close proximity to the City of Richmond and consider adopting open space requirements and/or a biological and natural resource habitat overlay district in the City’s Zoning Ordinance to provide greater protection from future development pressures.</p>	<p>Planning Division <i>Parks and Landscaping Division East Bay Regional Parks District California Department of Fish and Wildlife San Francisco Bay Regional Water Quality Control Board Bay Conservation and Development Commission US Army Corps of Engineers</i></p>	<p>Mid-term</p>

GOAL 2: EXPAND THE URBAN FOREST THROUGH URBAN GREENING INITIATIVES

Expand the urban forest by planting trees, shrubs, grasses and other plants in public spaces, parks, opportunity sites, conservation areas and new projects of all types to actualize the environmental, social and economic benefits of a healthy urban forest. Adopt City-wide standards and practices that support the use of green infrastructure in new development and infrastructure projects. Consider establishing minimum canopy coverage requirements for residential neighborhoods to support an equitable distribution of the economic and health benefits of trees and urban greening, and prioritize planting projects in neighborhoods with low canopy coverage. Achieve the goals of the Urban Greening Master Plan by coordinating greening efforts across City plans as well as with community groups and municipal agencies. Support a diverse plant profile that is suited to soil area and site constraints.

Program 2-A: Activate a City-wide tree planting program on opportunity sites by supporting and expanding existing tree programs and events.

The City of Richmond currently owns and maintains approximately 22,000 trees on city-owned property and within the public right of way. The 13,000+ opportunity sites identified in the Urban Greening Master Plan present the potential to increase the City's public tree inventory by more than fifty percent. The City will continue to partner with community groups and the Urban Forest Advisory Committee to support a City-wide tree planting program to pursue new planting following industry best practices.

A City-wide tree planting initiative should leverage the City's existing Adopt-a-Tree program, which provides Richmond residents and property owners with the opportunity to have a tree planted in front of their property for free. Currently, the Parks and Landscaping Division oversees the application process and provides planting and maintenance resources to street tree adopters. Community groups have been instrumental in preparing adopt-a-tree sites for planting through providing concrete removal services. The City's Public Works and Parks and Landscaping Department should continue to partner with community groups for site preparation.

In the past, the City of Richmond Police Department and Parks and Landscaping Division has partnered with community groups to host successful tree planting days and events such as harvest festivals and Arbor Day. The Arbor Day Foundation provides information on the benefits of urban tree and general information about trees, including resources for tree identification, educator resources, and tree-themed gift and celebration ideas. The City will continue to provide technical, logistical and promotional support to these events to contribute to their continued success.

Program 2-B: Support urban greening initiatives by citizen action groups while following adopted industry best practices.

Community-based organizations and citizen action groups have a long legacy of undertaking tree planting campaigns in Richmond and present an important source of physical and outreach capacity for labor-intensive planting and maintenance tasks. The City will assist in leading and overseeing the activities of these groups to coordinate efforts, review and approve landscaping plans and planting practices by following established industry best practices, and support greening events.

The City will continue to support and help build community organization capacity by providing access to meeting spaces, collaborating on shared grant opportunities and other sources of funds, and remain receptive to community group ideas and proposals for new projects.

Policy 2-C: Follow plant species recommendations and biodiversity requirements for new planting projects, support the updated Approved Street Tree List (Appendix A), and routinely update recommendations to encourage plant selections that are suited to Richmond’s environmental urban conditions.

Following adoption of the Urban Greening Master Plan, development of a Phase II Urban Forest Management Plan will be necessary to support the City’s greening goals by specifying planting methods and formalizing industry best practices for landscape planting and maintenance, consistent with development standards in the City’s municipal code. Appendix B includes current information on best practices and provides a starting place for the plan. The Urban Forest Management Plan could establish drought-tolerant plant species recommendations and plant biodiversity requirements for new development to (a) prioritize the use of disease-resistant species and appropriate native species in new plantings, (b) use appropriate tree species and densities in buffer areas, (c) ensure that medians include suitable and/or native plants and trees and are wide enough to support their long-term viability with the least demand for irrigation and maintenance, and (d) respect the 10-20-30 rule to create a resilient and diverse plant profile. The Approved Street Tree List will evolve as plant varieties are developed and exposed to pests, diseases and other pathogens.

The City’s Pedestrian Plan encourages the creation of a City-wide Street Tree Plan that identifies appropriate tree species, spacing, tree well sizes, and maintenance standards for street trees to prevent conflicts with utility infrastructure.³ A previously approved Street Tree List is currently provided on the City’s Parks and Landscaping Division website but is out of date and does not reflect the Approved Street Tree List,⁴ shown in Appendix A. The City should add the updated list which contains plant species recommendations that are sensitive to standard width and height constraints common along urban thoroughfares to the City’s website.

With coordinated protection, expansion and management efforts, Richmond’s urban forest will evolve. As this occurs, it will be necessary to reassess the City’s urban forest profile and potentially modify species and biodiversity recommendations to mitigate damage from pests, diseases and other environmental factors. The comprehensive City-wide urban forest inventory will have a pivotal role in the success of such as assessment and therefore it is crucial that the inventory be adequately maintained (also see Policy 3-A).

Policy 2-D: Establish development best practices to expand the urban forest through sustainable design.

Establish a set of best practices for the design of new development projects and subdivisions to address environmental concerns such as stormwater runoff and pollution of natural resources, heat absorption and the urban heat island effect, all of which are factors that negatively impact the health of the City’s urban forest. The process to develop these best practices could include:

³ City of Richmond Pedestrian Plan. Adopted November 1, 2011. Page 40. Accessed February 11, 2016. < <http://www.ci.richmond.ca.us/DocumentCenter/View/27071> >

⁴ Refer to page 100 of the Urban Greening Master Plan for detail regarding Richmond’s Approved Street Tree List.

Model green design standards adopted by the state and federal government to encourage the use of green infrastructure in all new development projects.

Review and modify the zoning and subdivision ordinances, where necessary, to improve consistency with state and federal government green design standards for new development to encourage the use of green infrastructure. These standards should reflect the Municipal Regional Permit green street requirements adopted by the Regional Water Quality Control Board. These regulations highlight the use and benefits of green infrastructure, and specifically bioretention technology, in new development. The “50% rule” for projects on previously developed sites requires that new projects that result in an alteration of more than 50% of the impervious surface of a previously existing development be included in updated treatment measure design. Specifically, Provision C.3 of the Regional Water Board Municipal Regional Permit (MRP) requires that new applicable developments achieve the following:

- » Design the site to minimize imperviousness, detain runoff, and infiltrate, reuse, or evapotranspire runoff when feasible;
- » Cover or control sources of stormwater pollution;
- » Treat runoff prior to discharge from the site;
- » Ensure runoff does not exceed pre-project peaks and durations;
- » Maintain treatment and flow-control facilities.⁵

As part of the City’s Zoning Ordinance Update, the requirement to include a stormwater management plan in applications for new development projects shall be reviewed and integrated to comply with the Municipal Regional Permit (MRP). Adopting such performance standards is one way to encourage and enforce sustainable development practices.

Consider adopting shading requirements and heat mitigation measures for new infrastructure projects.

Consider adopting shading requirements or other heat mitigation measures such as cool pavement or permeable pavers in the City’s zoning ordinance to reduce the urban heat island effect of paved infrastructure such as new streets, sidewalks, and parking areas. Cool pavements are those with properties that allow them to have increased solar reflectance, rather than absorption.⁶ The U.S. Environmental Protection Agency identifies several types of cool pavements in their Reducing Urban Heat Islands: Compendium of Strategies publication,⁷ including:

- » Conventional asphalt and concrete pavements that have been modified with high albedo materials or treated after installation to increase its reflective properties
- » Reflective pavements, such as resin-based pavements, colored asphalt and concrete
- » Non-vegetative permeable pavements, such as porous asphalt, rubberized asphalt, pervious concrete and brick or block pavers
- » Vegetated permeable pavements, which use non-vegetative grids for support and allow vegetation to grow in interstitial spaces.

⁵ Contra Costa Clean Water Program. 2015. Stormwater C.3 Guidebook. Stormwater Quality Requirements for Development Applications. Page 12. PDF.
⁶ U.S. Environmental Protection Agency. 2014. “Reducing Urban Heat Islands: Compendium of Strategies. Draft – Cool Pavements.” PDF. Accessed 1/4/16. < <http://www.epa.gov/sites/production/files/2014-06/documents/coolpavescompendium.pdf>>
⁷ Ibid. The full report can be accessed at <http://www.epa.gov/heat-islands/heat-island-compendium>.

The Richmond Livable Corridors Form-Based Code, Appendix B: Sustainability Guidelines,⁸ identifies several heat mitigation strategies for new development, especially in high-density projects, including:

- » The use of vegetated roofs to decrease building cooling loads
- » Providing underground parking to reduce heat absorption on pavement
- » Planting trees within parking lots to provide shade
- » Designing buildings with vegetative courtyards

Consider adopting State and local agency water conservation and stormwater management guidelines to promote sustainable development.

Review recommended greening strategies and existing landscape and irrigation regulations to ensure compliance with water conservation and restriction policies established by agencies such as EBMUD and those required by the State, such as the Water Efficient Landscaping Ordinance (WELO).⁹ Assembly Bill 1881 (2006) required the Department of Water Resources to update the Water Efficient Landscaping Ordinance in accordance with specific requirements. Adopted landscaping requirements applicable to new development projects should be reviewed and updated to ensure that they are as aggressive in prioritizing water conservation and stormwater runoff reduction principles as the 2015 WELO. Updated policy should consider factors such as soil conditions, maximum allowable coverage of impermeable surfaces, sprinkler flows, water requirements for different plants, grading and evaporation rates.¹⁰ The City also has the authority to establish local controls such as a water use restriction ordinance and/or landscape water budget for public and private irrigation users.

Consider the establishment of clear performance standards for development near creeks and encourage the daylighting and restoration of creeks.

Research best practices and create a system of performance standards for any development in creek corridors to support riparian and wildlife habitat, enable wildlife habitat linkages, prevent sinkholes and structural damage to existing structures, and allow for filtration of urban runoff to improve water quality.¹¹ These performance standards could include:

- » Creek setbacks
- » Limits on uses and structures
- » Require permits for culverts, walls and other structures within creeks
- » Restrictions on grading or other landscape alterations

Creek restoration performance standards shall be sensitive to developed areas of the City where substantial buffer zones are impractical given existing conditions. It may be necessary to establish performance standards that differentiate between land use classifications and/or allow for Planning Director discretion regarding specific site conditions.

⁸ See also: Richmond Livable Corridors Form-Based Code (Final Draft: February 2015), Appendix B: Sustainability Guidelines, page B-16.

⁹ The California Model Water Efficient Landscape Ordinance may be found in Title 23, Chapter 2.7 of the California Code of Regulations.

¹⁰ See also: City of Richmond Zoning Ordinance Update Issues and Options Report, recommendation 8-A.

¹¹ See also: City of Richmond Zoning Ordinance Update Issues and Options Report, recommendation 8-D.

The practice of daylighting returns some or all of a previously covered river, creek, stream or drainage to its natural conditions by restoring it to an open surface channel. Daylighting of creeks and streams results in numerous benefits, including increased capacity of flood control, reduced downstream erosion and sewer overflows, as well as improved ecological function, water quality and recreation opportunities. The restoration of native plant communities and the creation of wildlife habitat are also important outcomes of creek restoration practices.

As described in the Parks Master Plan, a number of sites in the Richmond park system include natural creeks, or are directly adjacent to creek habitat. Some creeks have been buried or channelized as part of urban development. Creek habitat can be incorporated into the rehabilitation of park sites either by restoration of existing creek areas or by daylighting of underground creeks and restoring the habitat to a natural state. To support this effort, the City will identify other areas, in addition to its parks, where daylighting of creeks and/or restoration of creek habitat can be implemented.

Policy 2-E: Coordinate Green Strategies with other City-wide plans to achieve mutual goals.

Integrate greening strategies identified in the UGMP with actions in other City plans such as the Climate Action Plan, Parks Master Plan, Bike and Pedestrian Plans. Many of the actions identified in the Urban Greening Master Plan will assist in achieving the goals of the Climate Action Plan, Parks Master Plan, and Bike and Pedestrian Plans.

The greening component of the City's existing "complete streets" design principle included in the City's Pedestrian Plan, for example, aligns with the expansion of the urban forest as described in the Urban Greening Master Plan. In 2015, the City of Richmond, in collaboration with the City of San Pablo and several partners, published the Final Complete Streets study of Rumrill Boulevard/13th Street, which provides street tree, landscaping, and plant palette designs to improve conditions for pedestrians, bicyclists, and transit riders.¹² Identification of such project synergies and a collaborative approach to implementing adopted plans will allow for leveraging of funding opportunities to achieve mutual goals simultaneously.

To capitalize on these mutual benefits, consider developing an efficient mechanism whereby recommended actions and funding opportunities can be assessed and prioritized based on their ability to make progress towards achieving the goals of multiple plans.

Program 2-F: Support urban agriculture through inclusive land use policy.

Agricultural land uses provide urban greening as well as commercial and employment opportunities. Explore the feasibility of establishing orchards and other forms of commercial crop production such as citrus, fruits, vegetables and vineyards within the City.

¹² More information regarding the Rumrill Boulevard/13th Street Complete Streets project, and access to the final report, is available at: <http://www.ci.richmond.ca.us/3161/Rumrill-Blvd-13th-St-Complete-Streets-St>

Urban agriculture provides a significant opportunity to engage the community in growing Richmond's urban forest while providing a variety of community benefits, such as community development, entrepreneurship and recreational opportunities, and a source of local nutritious food. The design and expanse of community gardens and urban agriculture can range from small plots of vegetables to large greening projects intended to preserve natural areas. Regulation of urban agriculture activities and design standards can ensure that urban agriculture is supported in the City and that it is harmonious with surrounding uses. The Parks Master Plan recommends that some park designs incorporate community gardens and identify parks that could accommodate farmer's markets. Community and individual gardens provide fresh produce and plants, enhance neighborhoods and provide a connection to nature.

The City of Richmond Urban Agriculture Assessment, completed in October 2011, profiles existing urban agriculture initiatives and includes a map identifying opportunity sites for urban agriculture, including community gardens. Equipped with this information, the City's Landscaping and Parks Division, in partnership with the Planning Department and community groups, shall integrate community gardens into park designs as an urban greening strategy that provides environmental stewardship and engagement opportunities. An updated Urban Agriculture Assessment that identifies the most tillable, fertile areas of the City, will support this effort. Potential urban agriculture sites should be evaluated based on water demand, environmental and soil conditions, and existing well water quality.

Policy 2-G: Update the Park and Recreation Dedication and Fees Ordinance to require new development and redevelopment projects to pay a fair share of the costs of parkland acquisition and improvement.

Section 15.08.400 of the Richmond Municipal Code, most recently amended in 1980,¹³ establishes a Park Land Dedication Formula, applicable to developers of subdivisions, which requires the dedication of a fixed amount of acreage of park land per dwelling unit.¹⁴ The City of Richmond currently includes a number of "parks-deficient" communities, defined in the California Health and Safety Code as areas where there are fewer than three acres of parkland per 1,000 residents. See California Health and Safety Code, Section 50700-50704.5. As part of the Zoning Ordinance Update, subdivision regulations will be reexamined to ensure that the requisite number of parkland is provided in subdivision projects.

Perform a nexus study and update the required development impact fee schedule to ensure that funding is available for the development of new parklands. Consider establishing a replacement ratio for open space and parkland to ensure that there is no net loss of open space in the City due to new development projects.

¹³ See Ordinance no. 19-80

¹⁴ See Richmond Municipal Code, Chapter 15.08, Subdivisions.

Policy 2-H: Consider negotiating with private land owners and State agencies for the establishment of open space and planting area easements.

To protect and expand Richmond’s urban forest, consider negotiating open space easements with private land owners where there are opportunities to preserve natural resources and wildlife habitat, increase open space, and benefit from ecosystem services. Negotiating open space easements is one method of expanding and protecting the City’s biological and resource protection areas (refer to Policy 1-B). Furthermore, consider working with State agencies such as CalTrans and the East Bay Regional Park District, who exercise authority over land within the City of Richmond, to incorporate urban greening efforts into infrastructure projects

GOAL 2 RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department <i>Supporting Departments in Italics</i>	Timeframe
Program 2-A	<p>Activate a City-wide tree planting program on opportunity sites by supporting and expanding existing tree programs and events.</p> <p>The City of Richmond currently owns and maintains approximately 22,000 trees on city-owned property and within the public right of way. The 13,000+ opportunity sites identified in the Urban Greening Master Plan present the potential to increase the City’s public tree inventory by more than fifty percent. The City will continue to partner with community groups and the Urban Forest Advisory Committee (UFAC) to support a City-wide tree planting program to pursue new planting following industry best practices.</p>	<p>City Manager’s Office – Environmental Initiatives <i>Parks and Landscaping Division Public Works Department Urban Forestry Advisory Committee Richmond Police Department</i></p>	Short-term/Ongoing
Program 2-B	<p>Support urban greening initiatives by citizen action groups while following adopted industry best practices.</p> <p>Community-based organizations and citizen action groups have a long legacy of undertaking tree planting campaigns in Richmond and present an important source of physical and outreach capacity for labor-intensive planting and maintenance tasks. The City with the help of the UFAC, will assist in leading and overseeing the activities of these groups to coordinate efforts, review and approve landscaping plans following established industry best practices, and support greening events. The City will continue to support and help build community organization capacity by providing access to meeting spaces, collaborating on shared grant opportunities and other sources of funds, and remain receptive to community group ideas and proposals for new projects.</p>	<p>City Manager’s Office – Environmental Initiatives <i>Parks and Landscaping Division Planning Division Mayor’s Office</i></p>	Mid-term
Policy 2-C	<p>Follow plant species recommendations and biodiversity requirements for new planting projects, adopt the updated Approved Street Tree List, and routinely update recommendations to encourage plant selections that are suited to Richmond’s environmental conditions.</p> <p>Following adoption of the Urban Greening Master Plan, development of a Phase II Urban Forest Management Plan will be necessary to support the City’s greening goals by specifying planting methods and formalizing industry best practices for landscape planting and maintenance, consistent with development standards in the City’s municipal code. The Urban Forest Management Plan could establish drought-tolerant plant species recommendations and plant biodiversity requirements for new development to (a) prioritize the use of disease-resistant adapted, naturalized and/ or native species in new plantings, (b) use appropriate tree species and densities in buffer areas, (c) ensure that medians include suitable plants and trees and are wide enough to support their long-term viability with the least demand for irrigation and maintenance, and (d) respect the 10-20-30 rule to create a resilient and diverse plant profile. The Approved Street Tree List will evolve as plant varieties are developed and exposed to pests, diseases and other pathogens.</p>	<p>Planning Division <i>Parks and Landscaping Division Public Works Department</i></p>	Long-term

GOAL 2 RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department <i>Supporting Departments in Italics</i>	Timeframe
Policy 2-D	<p>Consider the establishment of development best practices to expand the urban forest through sustainable design.</p> <p>Consider establishing a set of best practices for the design of new development projects and subdivisions to address environmental concerns such as stormwater runoff and pollution of natural resources, heat absorption and the urban heat island effect, all of which are factors that negatively impact the health of the City's urban forest. The process to develop these best practices could include:</p> <ul style="list-style-type: none"> » Model green design standards adopted by the state and federal government to encourage the use of green infrastructure in all new development projects. » Consider adopting shading requirements and heat mitigation measures for new infrastructure projects. » Consider adopting State and local agency water conservation and stormwater management guidelines to promote sustainable development. » Consider the establishment of clear performance standards for development near creeks and encourage the daylighting and restoration of creeks. 	<p>Planning Division <i>Engineering Services Department</i> <i>Public Works Department</i></p>	Mid-term
Program 2-E	<p>Coordinate green strategies with other City-wide plans to achieve mutual goals.</p> <p>Integrate greening strategies identified in the UGMP with actions in other City plans such as the Climate Action Plan, Parks Master Plan, Bike and Pedestrian Plans. Many of the actions identified in the Urban Greening Master Plan will assist in achieving the goals of the Climate Action Plan, Parks Master Plan, and Bike and Pedestrian Plans.</p>	<p>Planning Division City Manager's Office – <i>Environmental Initiatives</i> <i>Engineering Services Department</i></p>	Short-term/Ongoing
Program 2-F	<p>Support urban agriculture through inclusive land use policy.</p> <p>Agricultural land uses provide urban greening as well as commercial and employment opportunities. Explore the feasibility of establishing orchards and other forms of commercial crop production such as citrus, fruits, vegetables and vineyards within the City.</p>	<p>Parks and Landscaping Division Planning Division</p>	Mid-term/Ongoing
Policy 2-G	<p>Update the Park and Recreation Dedication and Fees Ordinance to require new development and redevelopment projects to pay a fair share of the costs of parkland acquisition and improvement.</p> <p>Perform a nexus study and update the required development impact fee schedule to ensure that funding is available for the development of new parklands. Consider establishing a replacement ratio for open space and parkland to ensure that there is no net loss of open space in the City due to new development projects.</p>	<p>Parks and Landscaping Division City Manager's Office Planning Division Public Works</p>	Mid-term
Policy 2-H	<p>Consider negotiating with private land owners and State agencies for the establishment of open space and planting area easements.</p> <p>To protect and expand Richmond's urban forest, consider negotiating open space easements with private land owners where there are opportunities to preserve natural resources and wildlife habitat, increase open space, and benefit from ecosystem services. Furthermore, consider working with State agencies such as CalTrans, who exercise authority over land within the City of Richmond, to incorporate urban greening efforts into infrastructure projects.</p> <p>Negotiating open space easements is one method of expanding and protecting the City's biological and resource protection areas (refer to Policy 1-B.)</p>	<p>Planning Division City Attorney's Office</p>	Ongoing

GOAL 3: MANAGE & SUPPORT THE URBAN FOREST & URBAN GREENING

Manage the urban forest to ensure its long-term sustainability through City-led maintenance efforts and by fostering community stewardship and supporting urban greening community groups.

Program 3-A: Partner with community groups for tree planting and maintenance.

Formalize partnerships with community groups with the assistance of the Urban Forest Advisory Committee (UFAC) following the guidance of trained and approved arborists to coordinate the planting and maintenance of Richmond's trees. Community groups have played a critical role with tree planting and securing program funds; however, the City remains instrumental to the success of City-wide urban greening initiatives. The City will continue to provide support to community groups in their efforts. The UFAC can assist in coordinating and bring together diverse groups to create strong partnerships.

Supporting and assisting citizen action groups builds capacity to focus on tree planting and preservation promotes public stewardship of the urban forest. These action groups are typically non-profit, volunteer organizations, and may focus solely on tree planting or have a wider scope such as watershed stewardship. Members of these groups are drawn from homeowners associations, garden clubs, school groups and environmental groups. These organizations raise community awareness of the benefits of trees and can also raise funds for tree planting and tree care activities. Citizen tree groups can provide assistance to private landowners on tree planting, particularly when the community does not have a forester or arborist on staff.

Program 3-B: Maintain and expand the urban forest inventory to reflect the diversity of urban greening projects in Richmond.

A key component of developing the Urban Greening Master Plan was the field survey and inventory of City-owned trees. The City may hire consultants and/or formalize partnerships with community groups to maintain an accurate and up-to-date spatial forest inventory and consider expanding the current inventory to include privately-owned trees to better understand the biological diversity and maintenance needs of the urban forest. Data updates will be completed regularly to track and monitor the City's success in meeting goals for growing and maintaining the urban forest. Consider setting aside a small budget for regular professional updates and/or partnering with urban forestry citizen action groups ensure that the database is adequately maintained.

The urban forest extends beyond the City's trees to include smaller plants, wildlife, organisms, soil, water and air, and the urban forest inventory should reflect this diversity. Therefore, a spatial inventory of urban greening must include green infrastructure projects, conservation areas, community gardens, parks and other green spaces to inform City staff and the community of the distribution of greening across the City and assist in the identification of priority greening areas.

Program 3-C: Continue to enforce the City's Integrated Pest Management ordinance to foster plant and wildlife biodiversity

Continue to enforce the City's Integrated Pest Management (IPM) ordinance (R.M.C. 9.48) to foster plant and wildlife biodiversity through restricting the use of pesticides (and herbicides) and requiring that the least-toxic pesticide be applied when necessary.

Adopted by the Richmond City Council in 2012, the IPM ordinance restricts the use of pesticides throughout the City and prohibits the application of toxic pesticides such as organophosphates, carbamates and known carcinogens. The Ordinance also bans the application of pesticides in sensitive areas such as riparian zones and City-owned picnic areas, except in emergency situations. The City's 2015-2016 adopted Budget includes funding for five events that include IPM training and related public outreach.¹⁵

At times, maintenance of the City's tree canopy or other urban greening areas and the requirements of the IPM ordinance may be in conflict. To support the City's ability to remain knowledgeable of new IPM strategies and technologies, Landscaping and Parks Division staff will be encouraged to stay informed of the latest science through resources and 'best practices' guides provided by organizations such as UC Cooperative Extension, as well as attendance at annual IPM symposiums, and/or access to recent publications.

Program 3-D: Provide self-service stockpiles of clean compost and woodchips as a resource for urban greening projects.

Consider providing stockpiles of greening inputs such as compost and woodchips at the City Corporation Yard for use by community groups and residents for urban greening projects in Richmond.

The City of Richmond's Environmental Initiatives team hosts annual compost giveaways to Richmond residents and community groups; however, the City could consider stockpiling material in a secure area for residents to access on a more regular basis. Past compost giveaways have required constant oversight by City Staff and are labor-intensive events. By stockpiling resources for self-pickup, these materials can be more readily distributed to greening projects.

Compost and green waste should not come from sources where herbicides and/or pesticides have been used on plant material or lawns as the chemicals may remain in the material. This fact may present challenges to the City in achieving the State's organic diversion goals. The Department of Resources Recycling and Recovery's (CalRecycle/State) website says, 'During the last several years, farmers and home gardeners in several states have reported damage to vegetable and flower crops after applying compost and mulch that contained persistent pesticide residues. Damage to non-target species has also resulted from application of manure, hay, and grass clippings that contained persistent carboxylic acid herbicides. In addition, in 2009, bifenthrin residues in compost caused problems for organic farmers and compost producers. To address pesticide/herbicide residues in compost and mulch, CalRecycle regularly collaborates with the California Department of Pesticide Regulations (DPR), California Department of Food Agriculture (CDFA), U.S. Department of Agriculture's (USDA) National Organic Program (NOP), farmers, composters, and other stakeholders.'¹⁶ The quality of the compost is important and should be tested to determine if there are chemicals present and additives necessary to make the compost useable.

¹⁵ City of Richmond 2015-2016 Budget. Utilities Department. Page 5. Accessed January 9, 2015. < <http://www.ci.richmond.ca.us/DocumentCenter/View/34450>>

¹⁶ More information is available at: the CalRecycle website; <http://www.calrecycle.ca.gov/organics/threats/Pesticides/default.htm>

Program 3-E: Practice and promote proper tree care techniques for publicly- and privately-owned trees.

Practice and publicize proper tree care and pruning techniques for City-owned trees following recognized industry standards with the assistance of the Urban Forest Advisory Committee (UFAC). Partner with the UFAC and community groups to promote the use of these standards among homeowners and those who manage privately owned trees. Make proper tree care and maintenance techniques easily accessible through the Parks and Landscaping Division website for public access.

Support community organizations and citizen action groups by ensuring that adopted standards and procedures are readily accessible by attending and/or overseeing volunteer planting events to assist with planting and maintenance techniques. This information could be supplemented by community workshops led by Parks and Landscaping Division staff (see program 4-E).

Program 3-F: Support and encourage use of the City's tool lending library.

Support proper tree care by providing tree pruning and other maintenance tools at the City's tool lending library. Richmond's tool lending library is currently in its tool collection phase. Expand the scope of the tool lending library's list of accepted tools to include those designed specifically to maintain trees and other plants, such as clippers and tree saws, to promote proper care using the appropriate tool for each job.

Program 3-G: Support community participation in water conservation programs.

Partner with utility companies that have shared water conservation goals to encourage Richmond resident participation in lawn transformation programs such as EBMUD's lawn conversion and irrigation upgrade rebates. The current program effective January 1, 2015, provides up to \$2,500 in rebates for single family homes and up to \$20,000 for commercial and multi-family buildings for making cost-effective water conservation upgrades, such as converting sprinklers to drip irrigation and installing submeters to allow for faster leak detection.¹⁷ Identify incentives and promotional methods led by City to increase participation among Richmond residents.

Conservation programs could include public education campaigns about home and garden gray water collection and recycling systems, providing free or affordable residential water use audits, water conservation rate structures, retrofitting homes with low-flow plumbing devices, and developing a water management plan for City-owned buildings and practices that could be expanded to local businesses and/or non-profits.¹⁸ Infrastructure such as rain water catchment systems may also be used for supplemental irrigation on lawns, gardens and urban farms, as identified in the Parks Master Plan.¹⁹

17 East Bay Municipal Utility District. 2016. Lawn Conversion and Irrigation Upgrade Rebates. Accessed January 6, 2016. < <https://www.ebmud.com/water-and-drought/conservation-and-rebates/residential/rebates/lawn-conversion-irrigation-upgrade-rebates/>>

18 United States Environmental Protection Agency. July 2002. Cases in Water Conservation: How Efficiency Programs Help Water Utilities Save Water and Avoid Costs. PDF. Accessed January 6, 2016. http://www3.epa.gov/watersense/docs/utilityconservation_508.pdf

19 City of Richmond Landscaping and Parks Division. December 2010. Parks Master Plan. Page 151. PDF. Accessed January 8, 2016. < <http://www.ci.richmond.ca.us/DocumentCenter/View/7196>>

GOAL 3 RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department <i>Supporting Departments in Italics</i>	Timeframe
Program 3-A	<p>Partner with community groups for tree planting and maintenance.</p> <p>Formalize and standardize partnerships with community groups with the assistance of the Urban Forest Advisory Committee (UFAC) following the guidance of trained and approved arborists to coordinate the planting and maintenance of Richmond’s trees. Community groups have played a critical role with tree planting and securing program funds; however, the City remains instrumental to the success of City-wide urban greening initiatives. The City will continue to provide support to community groups in their efforts.</p>	<p><i>Parks and Landscaping Division</i></p> <p><i>Community-Based Organizations</i></p>	Mid-term
Program 3-B	<p>Maintain and expand the urban forest inventory to reflect the diversity of urban greening projects in Richmond.</p> <p>The urban forest extends beyond the City’s trees to include smaller plants, wildlife, organisms, soil, water and air, and the urban forest inventory should reflect this diversity. Therefore, a spatial inventory of urban greening must include green infrastructure projects, conservation areas, community gardens, parks and other green spaces to inform City staff and the community of the distribution of greening across the City and assist in the identification of priority greening areas.</p>	<p>Parks and Landscaping Division</p> <p>Community-Based Organizations</p>	Long-term/Ongoing
Policy 3-C	<p>Support the City’s Integrated Pest Management ordinance to foster plant and wildlife diversity.</p> <p>Support the City’s Integrated Pest Management (IPM) ordinance (R.M.C. 9.48) to foster plant and wildlife biodiversity through restricting the use of pesticides and requiring that the least-toxic pesticide be applied when necessary.</p>	<p>Landscaping and Parks Division</p> <p>Public Works Department</p> <p>Community-Based Organizations</p>	Short-term/Ongoing
Program 3-D	<p>Provide self-service stockpiles of compost and woodchips as a resource for urban greening projects.</p> <p>Consider providing clean, herbicide and pesticide free stockpiles of greening inputs such as compost and woodchips at the City Corporation Yard for use by community groups and residents for urban greening projects in Richmond.</p>	<p>City Manager’s Office – Environmental Initiatives</p> <p>Public Works Department</p> <p>Landscaping and Parks Division</p>	Mid-term/Ongoing
Program 3-E	<p>Practice and promote proper tree care techniques for publicly- and privately-owned trees.</p> <p>Practice and publicize proper tree care techniques for City-owned trees following industry standards. Partner with local and regional professionals and community groups with the assistance of the UFAC to promote the use of these standards among homeowners and those who manage privately owned trees. Make proper tree care and maintenance techniques easily accessible through the Parks and Landscaping Division website for public access.</p>	<p>Parks and Landscaping Division</p> <p>Community-Based Organizations</p>	Short-term
Program 3-F	<p>Support and encourage use of the City’s tool lending library.</p> <p>Support proper tree care by providing tree pruning and other maintenance tools at the City’s tool lending library.</p>	<p>City Manager’s Office</p> <p><i>Parks and Landscaping Division</i></p>	Short-term/Ongoing
Program 3-G	<p>Support community participation in water conservation programs.</p> <p>Partner with utility companies that have shared water conservation goals to encourage Richmond resident participation in lawn transformation programs such as EBMUD’s lawn conversion and irrigation upgrade rebates.</p>	<p>City Manager’s Office – Environmental Initiatives</p> <p>Municipal Utility Companies</p>	Mid-term/Ongoing

GOAL 4: EDUCATE AND PROMOTE STEWARDSHIP OF THE URBAN FOREST

Promote trees as economic and environmental resources for the use, education and enjoyment of current and future generations. Through educational and promotional initiatives, make clear the benefits of trees and urban greening to build community stewardship and support.

Policy 4-A: Explore opportunities to partner with the Urban Forestry Advisory Committee to support implementation of the Urban Greening Master Plan.

The Urban Forest Advisory Committee (UFAC) was reappointed in 2015 to “advise and assist the City Council in creating a healthy urban forest, as well as promote and foster public awareness, education, volunteerism, and public-private partnerships to support urban forestry initiatives.”²⁰ The City shall partner with the UFAC to support implementation of the Urban Greening Master Plan.

Program 4-B: Identify possible economic and workforce development opportunities associated with urban forestry.

Explore and provide connections to economic and workforce development opportunities with street tree planting and maintenance through partnerships with programs modeled after RichmondBUILD or UC Cooperative Extension Master Gardener Program of Contra Costa County.

Tree planting and urban forest maintenance are specialized skills that provide opportunities for workforce development in Richmond. RichmondBUILD is a successful public-private partnership focused on developing talent and skill in high-growth, high-wage employment sectors such as construction and renewable energy fields. A similar program could educate and employ Richmond residents in the fields of horticulture, arboriculture and/or landscape maintenance. Explore opportunities to engage youth in the implementation of the Urban Greening Master Plan, such as the inclusion of urban greening projects in the City’s Summer Youth Employment Program.

Program 4-C: Support the development of environmental curricula to foster environmental stewardship.

Support the development of curricula that relies on hands-on experiences in natural settings to foster environmental stewardship among young people and other interested parties. Some organizations that are doing this work in Richmond include Urban Tilth, Pogo Park, Groundwork Richmond, Self-Sustaining Communities, the Watershed Project, Fresh Approach, Earth Team, the Bay Area Community Resource, and Communities for a Better Environment.

²⁰ Resolution of the Richmond City Council no. 110-15.

According to the UC Master Gardener Program, students in garden classrooms have exhibited improved academic performance, better social skills and behavioral conduct, more healthful nutritional preferences and greater self-esteem. The success of initiatives and organizations such as the Edible Schoolyard Project, which educates students at Berkeley's Martin Luther King, Jr. Middle School, exemplify the utility of school gardens for teaching purposes. The UC Master Gardener Program of Contra Costa County provides information and resources regarding the establishment of school gardens. Partnership with municipal agencies such as EBMUD to install water-saving components such as rainwater catchment systems provides additional opportunities to expand existing environmental curriculum about to include water and other natural resource conservation principles.

Program 4-D: Recognize significant trees and green infrastructure enhancements within Richmond.

Give recognition to Richmond's significant trees and green infrastructure enhancements by using the most recent tree database to create informational name tags or placards for trees and green infrastructure enhancements to educate the community about their significance.

In conjunction with Policy I-A, which seeks to strengthen the City's existing tree ordinances, partner with the UFAC, local design professionals and community groups to design and install name tags and informational placards explaining the tree's significance, similar to those found in an arboretum. These enhancements not only draw attention to these trees, but can also further promote stewardship of Richmond's urban forest. In addition to the placement of name tags or placards on or around significant trees, create similar informational signage on pedestrian pathways that are equipped or in close proximity to thoroughfares with green infrastructure improvements.

Program 4-E: Consider assisting in the development of tree workshops for residents and community members.

Consider assisting in the development of tree planting, care and maintenance workshops for residents and community members to inform individuals who may own and/or care for public and private trees of the adopted tree planting and maintenance standards used by the Parks and Landscaping Division. Partner with the UFAC, local and regional professionals and active and knowledgeable community-based organizations to offer and promote these events.

GOAL 4 RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department <i>Supporting Departments in Italics</i>	Timeframe
Policy 4-A	<p>Explore opportunities to partner with the UFAC to support implementation of the Urban Greening Master Plan.</p> <p>The Urban Forest Advisory Committee (UFAC) was reappointed in 2015 to “advise and assist the City Council in creating a healthy urban forest, as well as promote and foster public awareness, education, volunteerism, and public-private partnerships to support urban forestry initiatives.” The City shall partner with the UFAC to support implementation of the Urban Greening Master Plan.</p>	<p>Mayor’s Office <i>Parks and Landscaping Division</i> <i>Planning Division</i></p>	<p>Short-term; The Urban Forest Advisory Committee was reappointed on November 17, 2015 by Resolution 110-15.</p>
Program 4-B	<p>Identify possible economic and workforce development opportunities associated with urban forestry.</p> <p>Explore and provide connections to economic and workforce development opportunities with street tree planting and maintenance through partnerships with programs modeled after RichmondBUILD or UC Cooperative Extension Master Gardener Program of Contra Costa County.</p>	<p>City Manager’s Office - Economic Development</p>	<p>Mid-term</p>
Program 4-C	<p>Support the development of environmental curricula to foster environmental stewardship.</p> <p>Support the development of curricula that relies on hands-on experiences in natural settings to foster environmental stewardship among young people and other interested parties.</p>	<p>City Manager’s Office - Environmental Initiatives Mayor’s Office <i>In partnership with</i> <i>University Extension programs</i> <i>Community-Based Organizations</i> <i>WCCUSD</i></p>	<p>Long-term/Ongoing</p>
Program 4-D	<p>Recognize significant trees and green infrastructure enhancements within Richmond.</p> <p>Give recognition to Richmond’s significant trees and green infrastructure enhancements by using the most recent tree database to create informational name tags or placards for trees and green infrastructure enhancements to educate the community about their significance.</p>	<p>Parks and Landscaping Division Engineering Services Department <i>City Manager’s Office - Environmental Initiatives</i> <i>Community-Based Organizations</i></p>	<p>Mid-term</p>
Program 4-E	<p>Consider assisting in the development of tree workshops for residents and community members.</p> <p>Consider assisting in the development of tree planting, care and maintenance workshops for residents and community members to inform individuals who may own and/or care for public and private trees of the adopted tree planting and maintenance standards used by the Parks and Landscaping Division. Partner with the UFAC, local professionals and active and knowledgeable community-based organizations to offer and promote these events (refer to Program 3-E)</p>	<p>Parks and Landscaping Division</p>	<p>Short-term</p>

GOAL 5: FUND THE URBAN FOREST AND URBAN GREENING INITIATIVES

Seek out and establish funding resources to support the long-term sustainability of the urban forest.

Program 5-A: Identify funding sources for urban greening projects and support of the City's Parks and Landscaping Division.

The majority of recommended actions provided in the Urban Greening Master Plan will require fundraising efforts to see initiation and reach completion. As part of this Plan, several potential funding sources have been identified, however; as funding opportunities are constantly changing, it is essential that funding sources are updated and monitored. Many funding sources that are intended to achieve improvements such as promoting active transportation and providing affordable housing near transit to achieve greenhouse gas reductions can also include urban greening components.

The Regional Water Quality Control Board's adoption of green infrastructure requirements for new or substantially rehabilitated street developments is an unfunded mandate, which presents budgetary challenges to future projects. In addition to continually identifying sources of funding for urban greening projects, the Planning Department, Engineering Services Department, Water Resource Recovery Department and City Manager's Office must communicate about specific funding opportunities for bioretention technology and other green infrastructure improvements to ensure that new streets and substantial improvement projects are able to adhere to green infrastructure requirements and receive funding through completion.

Program 5-B: Incorporate the costs of sustainable landscaping in capital improvement project budgets.

Capital improvement projects revitalize the community by improving infrastructure surrounding community assets such as affordable housing, educational facilities, transportation hubs, and creating attractive spaces for community use. Successful capital improvement projects are the result of partnerships between the City, the school district, foundations, National Park Service, community-based organizations (CBOs), non-profits, and residents. Capital improvement projects present an opportunity to fund urban greening projects that improve public spaces by providing the aesthetic, environmental, economic and social benefits of urban greening. Including the costs of green infrastructure required in new or substantially rehabilitated streetscapes in capital improvement budgets is especially important in realizing opportunities to mitigate downstream costs of water treatment due to pollution.

Program, 5-C: Maintain the City's Tree City USA designation.

Continue to uphold the four standards required for the Tree City USA designation to better position Richmond to secure regional and national grants to support urban greening efforts.

Tree City USA was established in 1976 and is a national program sponsored by the Arbor Day Foundation in cooperation with the USDA Forest Service and the National Association of State Foresters. It provides direction, assistance, attention and recognition to urban and community forestry programs. The movement seeks to provide a framework through which cities can support and expand their population of publicly owned trees. Richmond first earned Tree City USA designation in 2009.

RIGHT

National Arbor Day
Foundation
<https://www.arborday.org/programs/treecityUSA/>



GOAL 5 RECOMMENDATIONS SUMMARY

Urban Greening Master Plan Policy or Program	Description	Lead Department <i>Supporting Departments in Italics</i>	Timeframe
Program 5-A	<p>Identify funding sources for urban greening projects and support of the City's Parks and Landscaping Division.</p> <p>The majority of recommended actions provided in the Urban Greening Master Plan will require fundraising efforts to see initiation and reach completion. As part of this Plan, several potential funding sources have been identified, however; as funding opportunities are constantly changing, it is essential that funding sources are updated and monitored. Many funding sources that are intended to achieve improvements such as promoting active transportation and providing affordable housing near transit to achieve greenhouse gas reductions can also include urban greening components.</p> <p>The Regional Water Quality Control Board's adoption of green infrastructure requirements for new or substantially rehabilitated street developments is an unfunded mandate, which presents budgetary challenges to future projects. In addition to continually identifying sources of funding for urban greening projects, the Planning Department, Engineering Services Department and City Manager's Office must communicate about specific funding opportunities for bioretention technology and other green infrastructure improvements to ensure that new streets and substantial improvement projects are able to adhere to green infrastructure requirements and receive funding through completion.</p>	Planning Division City Manager's Office – Environmental Initiatives Engineering Services Department	Short-term/Ongoing
Program 5-B	<p>Incorporate the costs of sustainable landscaping in capital improvement project budgets.</p> <p>Capital improvement projects revitalize the community by improving infrastructure surrounding community assets such as affordable housing, educational facilities, transportation hubs, and creating attractive spaces for community use. Successful capital improvement projects are the result of partnerships between the City, the school district, foundations, National Park Service, CBOs, non-profits, and residents. Capital improvement projects present an opportunity to fund urban greening projects that improve public spaces by providing the aesthetic, environmental, economic and social benefits of urban greening. Including the costs of green infrastructure required in new or substantially rehabilitated streetscapes in capital improvement budgets is especially important in realizing opportunities to mitigate downstream costs of water treatment due to pollution.</p>	City Manager's Office Engineering Services Department Planning Division	Mid-term
Program 5-C	<p>Maintain the City's Tree City USA designation.</p> <p>Continue to uphold the four standards required for the Tree City USA designation to better position Richmond to secure regional and national grants to support urban greening efforts.</p> <p>Tree City USA is a program of the Arbor Day Foundation that was established in 1976. The movement seeks to provide a framework through which cities can support and expand their population of publicly owned trees. Richmond first earned Tree City USA designation in 2009. To be considered for this designation, a city must achieve the following:</p> <ul style="list-style-type: none"> » Create and maintain a tree board or department (the recently appointed UFAC will serve as the qualifying tree board or department) » Create and uphold a tree care ordinance » Provide funding for a community forestry program » Observe and celebrate Arbor Day 	<i>Parks and Landscaping Division</i> <i>Mayor's Office</i> <i>City Manager's Office –</i> <i>Environmental Initiatives</i>	Ongoing





CHAPTER 5

IMPLEMENTATION

5.01 URBAN GREENING IMPLEMENTATION PROJECTS

As described in *Chapter 3.02*, the tree inventory identified over 13,000 street tree opportunity sites currently available within the City right-of-way. These opportunities include existing tree wells with no trees, tree wells that have been filled or paved, stretches of sidewalk with sufficient width to accommodate street trees, empty planting areas or planting areas with some vegetation but no trees, and other areas where trees could be planted. Over time the planting of trees in these opportunity sites will be the most significant implementation activity. Available resources to support street tree planting will dictate the pace and extent of this work.

The Urban Greening Master Plan supports and encourages the development of a healthy environment through greening efforts in all areas of the City. Table 5.1, lists proposed projects that illustrate focus areas where greening strategies could be effectively implemented on City-owned properties and within the existing public right-of-way. Project types include: street tree planting, storm water management project, creek daylighting, urban agriculture, traffic calming and complete streets, new park development incorporating greening strategies and green alleyways. Figures 5.1–5.7, show projects with illustrative diagrams describing the scope of the greening project envisioned. Clear definition of other projects listed is subject to available resources and other constraints not currently known. Several of the implementation projects recommended by this Richmond Urban Greening Master Plan have been completed or are currently in design. The completed projects are built examples of the project types encouraged by the Urban Greening Master Plan and will help expand and strengthen Richmond’s tree canopy and green infrastructure.

BELOW

Table 5.1 Urban Greening Implementation Projects



URBAN GREENING IMPLEMENTATION PROJECTS

The following list of proposed projects illustrates focus areas where greening strategies could be effectively implemented on city-owned properties and within the existing public right of way.

Project Description	Location
Street Tree Planting on Significant Streets	
	<i>The recently completed street tree inventory identified existing tree planting opportunities in the public right of way</i>
23rd Street / Marina Bay Parkway	156 available planting locations as of May 2014
Barrett Ave.	108 available planting locations as of May 2014
Carlson Blvd.	174 available planting locations as of May 2014
Cutting Blvd.	101 available planting locations as of May 2014
Harbour Way	122 available planting locations as of May 2014
Hilltop Drive	79 available planting locations as of May 2014
Macdonald Ave.	149 available planting locations as of May 2014
Pennsylvania Ave.	49 available planting locations as of May 2014
San Pablo Ave.	73 available planting locations as of May 2014
Tree Planting and Storm Water Runoff Management in City-Owned Parking Lots and Storage Areas	
Parking Areas at Richmond Civic Center	See attached diagram - City Owned Parking 1
Parking Areas at Richmond Corporation Yard	See attached diagram - City Owned Parking 2
Baxter Creek Day Lighting / Improvements at Booker T. Anderson Park	
The details and scope of this project will be developed as resources become available.	
Tree Planting and Urban agriculture at Miraflores Greenbelt	
The details and scope of this project will be developed as resources become available.	
Center Median, Curbside Planting, and Traffic Calming San Pablo Avenue	
A proposed 14' wide center median with curbside planting and traffic calming bulb outs.	See attached diagram - San Pablo Avenue Median
Planting / Greening Projects at Richmond Greenway	
Unity Park - a new 8 acre neighborhood park	
Greening the Last Mile - A 1.2 mile eastern section of the Richmond Greenway. Portions of this project that are currently funded include: Carlson Meadow, 33rd Street, and 39th Street.	
The details and scope of additional future project will be developed as resources become available.	
Green Alleys	
Mathieu Court Alley – replace 16,000 square feet of impervious paving with landscaped areas, and with pervious pavers and/or turf cell where vehicle access is necessary.	

OPPOSITE
Table 5.3 City Owned
Parking No. 1



PROJECT DESCRIPTION

The City of Richmond owns and maintains approximately 4 1/2 acres of paved parking at the Civic Center complex. Implementation Project #1 includes renovation of these parking areas to allow for the following greening strategies.

TREE PLANTING FOR CARBON CAPTURE AND PAVEMENT SHADING

- 1) Street trees are to be planted in existing tree wells at the back of curb where possible.
- 2) Adjustment of existing parking configuration to allow for tree planting within parking areas. The goal of this planting is to achieve a 50% shading of the parking areas when trees mature.

TREATMENT OF STORM WATER RUN OFF

- 1) The project will include adjustment of existing surface drainage patterns to allow for capture and treatment of storm water run off before it is released into the city storm drain system.
- 2) Installation of permeable paving materials is also encouraged where possible to reduce storm water run off.



CITY OWNED PARKING 1

NOT TO SCALE:



BELOW

Table 5.2 City Owned Parking No. 2



PROJECT DESCRIPTION

The City of Richmond owns and maintains approximately 2 acres of parking and storage at the Corporation Yard complex. The surface is a mix of impermeable and gravel paving. Implementation Project #2 includes renovation of these parking and storage areas to allow for the following greening strategies.

TREE PLANTING FOR CARBON CAPTURE AND PAVEMENT SHADING

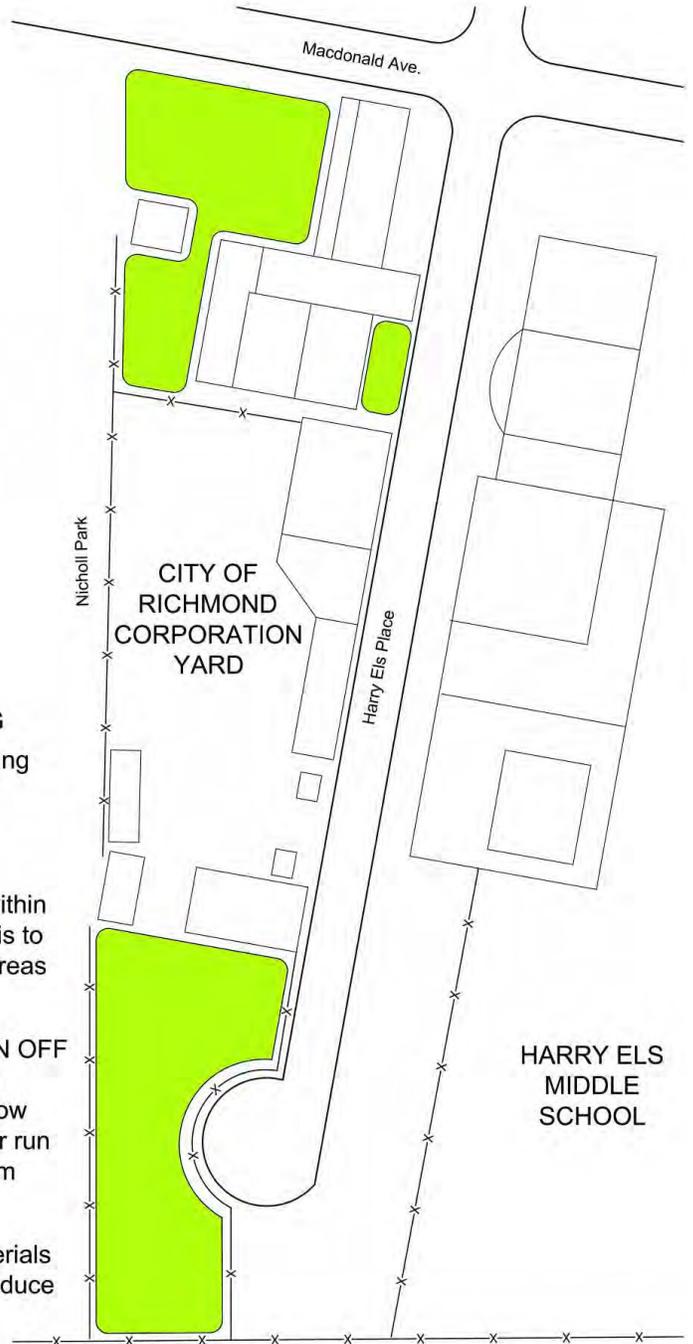
1) Street trees are to be planted in existing tree wells at the back of curb where possible.

2) Adjustment of existing parking configuration to allow for tree planting within parking areas. The goal of this planting is to achieve a 50% shading of the parking areas when trees mature.

TREATMENT OF STORM WATER RUN OFF

1) The project will include adjustment of existing surface drainage patterns to allow for capture and treatment of storm water run off before it is released into the city storm drain system.

2) Installation of permeable paving materials is also encouraged where possible to reduce storm water run off.



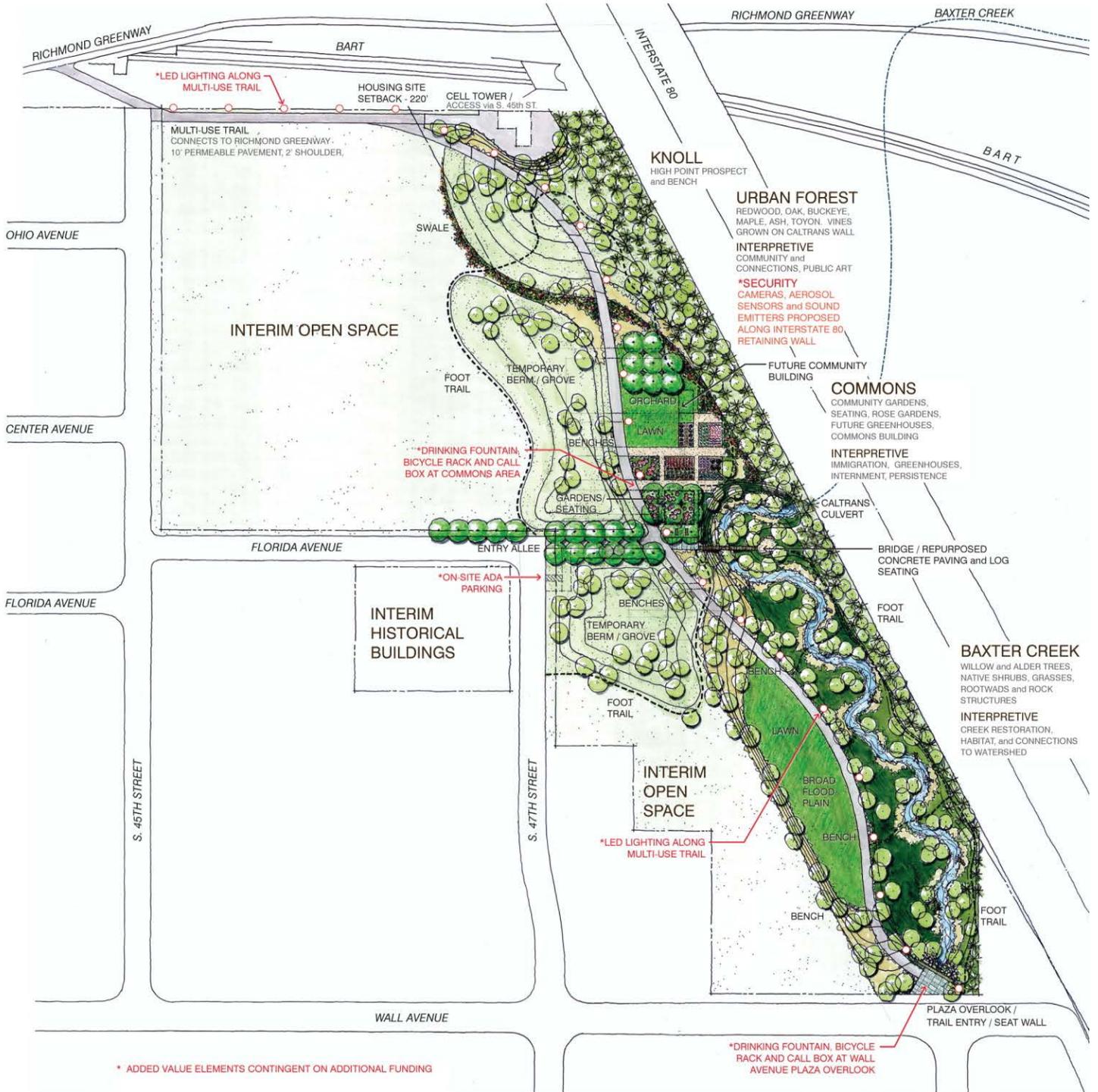
CITY OWNED PARKING 2

DIAGRAM NOT TO SCALE



BELOW

Table 5.4 Tree Planting, Creek Daylighting and Urban Agriculture at Miraflores Greenbelt



* ADDED VALUE ELEMENTS CONTINGENT ON ADDITIONAL FUNDING

*DRINKING FOUNTAIN, BICYCLE RACK AND CALL BOX AT WALL AVENUE PLAZA OVERLOOK



PROJECT DESCRIPTION

Implementation Project #3 consists of improvements along a six block section of San Pablo Avenue. The work includes street tree planting, median sections, sidewalk adjustments, and curb reconfigurations to allow for the following greening strategies.

TREE PLANTING FOR CARBON CAPTURE AND PAVEMENT SHADING

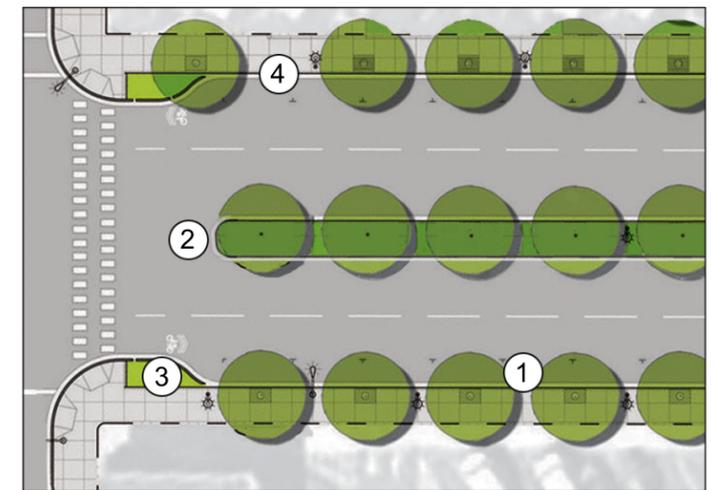
- 1) Street trees are to be planted in existing tree wells at the back of curb where possible.
- 2) Sections of the existing center turn lane are to be replaced with a median planter strip which will allow for tree planting. Note, traffic study at the design phase of the project will determine the locations and geometry of the median planters and breaks in between. Locations shown on this diagram are conceptual.

TREATMENT OF STORM WATER RUN OFF

- 3) The project will include adjustment of existing curb lines to allow for capture and treatment of storm water run off before it is released into the city storm drain system.
- 4) Installation of permeable paving materials is also encouraged where possible to reduce storm water run off.

BENEFITS ANTICIPATED

Implementation of this project will reduce the heat island effect generated by paved areas, increase the carbon sequestration capacity of the urban forest, reduce storm water run off and improve the quality of remaining run off.



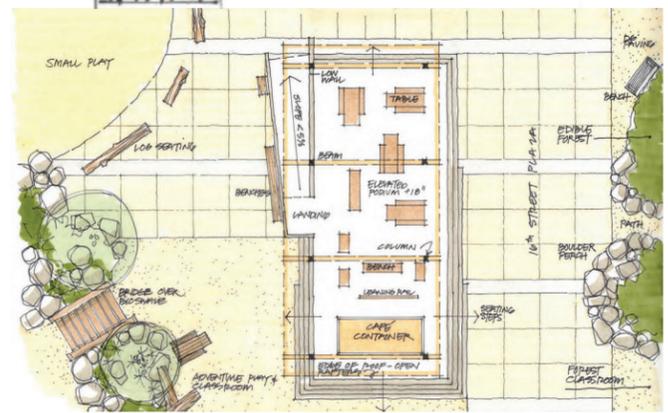
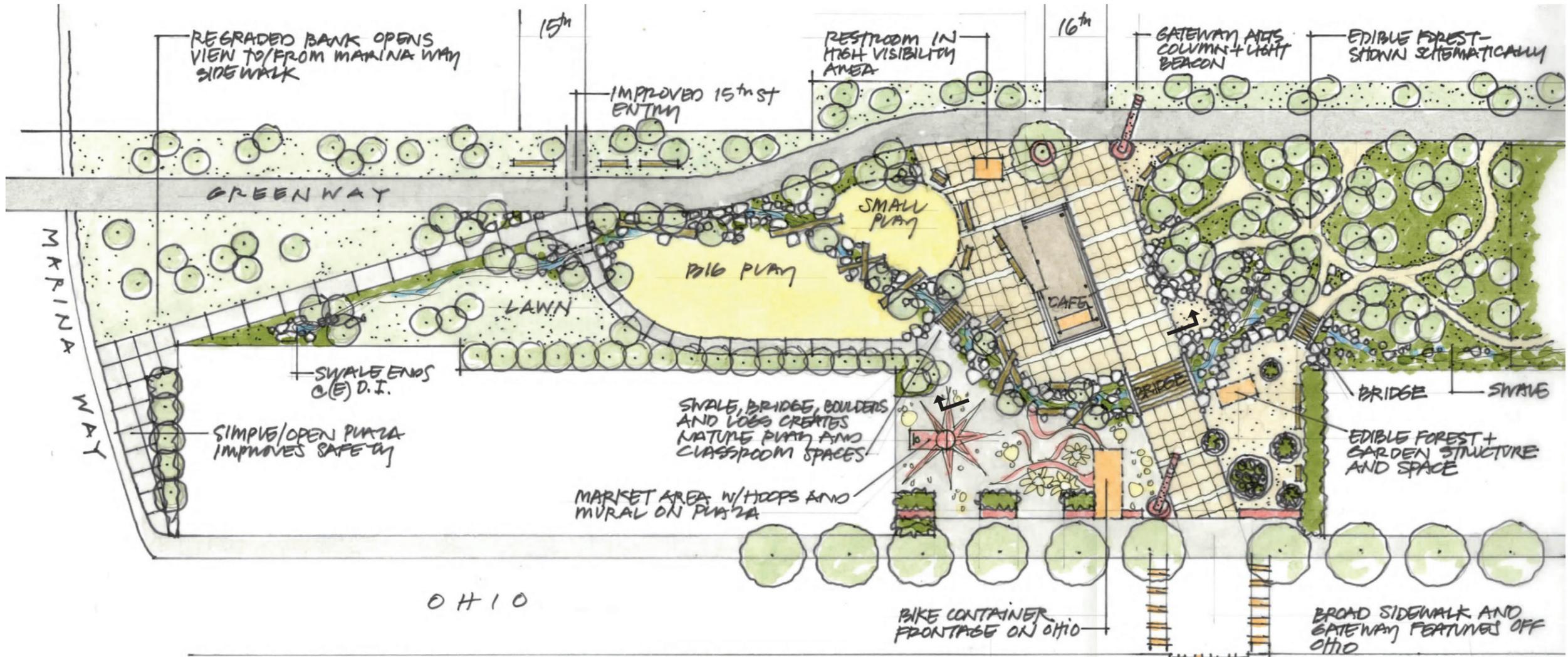
VIGNETTE
IMPROVEMENTS - SAN PABLO AVENUE

SAN PABLO AVENUE MEDIAN

SCALE: 1"=100'



OPPOSITE
 Table 5.7 Unity Park, Planting and Greening Project within the Richmond Greenway. Project includes storm water management and urban agriculture



SWALE BRIDGE ADVENTURE/NATURE PLAY PLAY AREA SEATING SHADE STRUCTURE WITH FUTURE CAFE CONTAINER 16th ST./UNITY PLAZA BOULDER PERCH / CLASSROOM

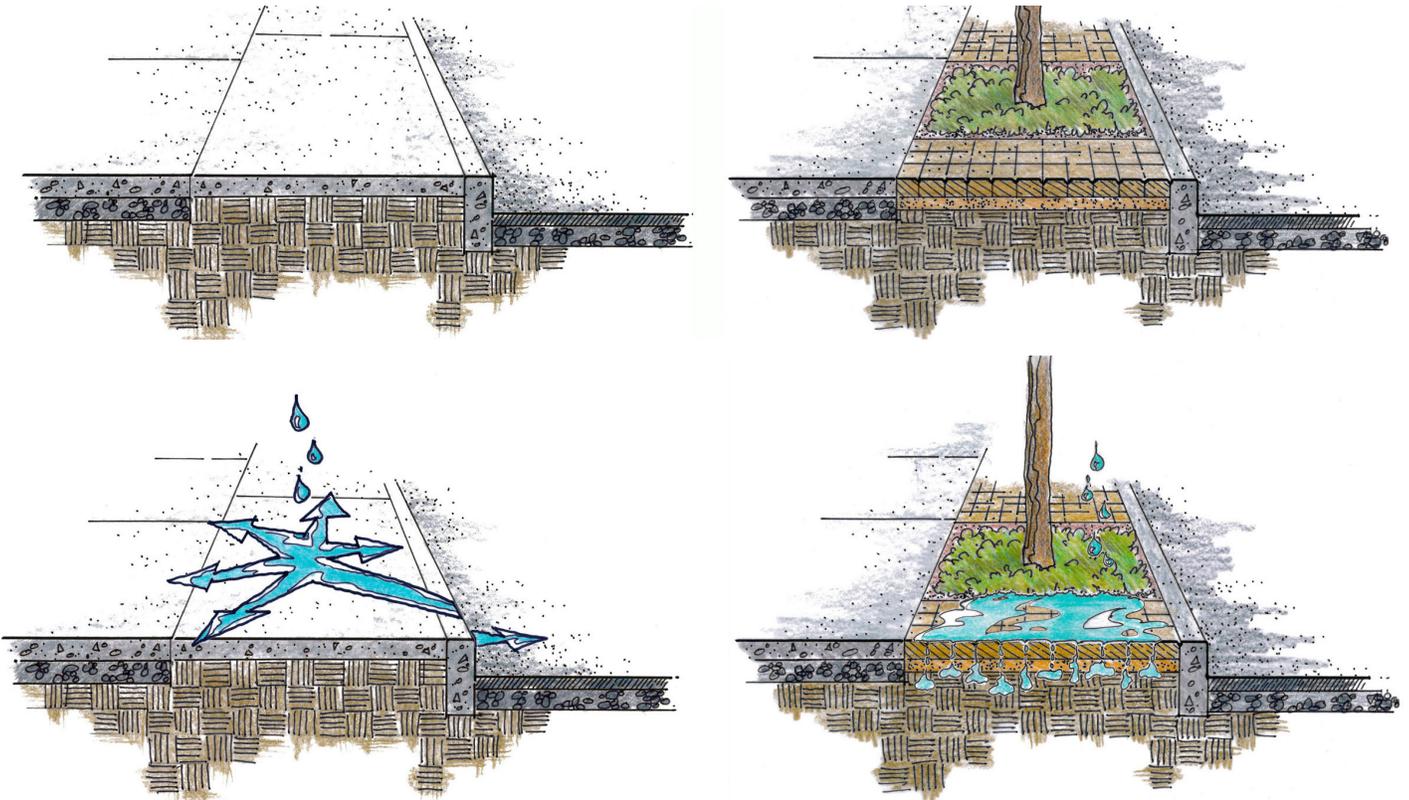
UNITY PARK | MARINA - 16TH - MASTER PLAN

SCALE: 1" = 20'

7 OCTOBER 2015

5.02 ELEMENTS OF GREEN INFRASTRUCTURE & SUSTAINABLE DESIGN

As shown in Table 5.1: Urban Greening Implementation Projects, efforts to expand the urban forest are not limited to street tree planting. At the scale of a City or county, green infrastructure refers to the patchwork of designed natural areas and features that provide wildlife habitat, flood protection, cleaner air, and water filtration. The inclusion of green infrastructure into urban structures and hardscapes presents an important opportunity to integrate the urban forest throughout Richmond. Adoption over time of standards and practices that enhance green infrastructure will support the urban forest's expansion. This section provides a brief introduction to various sustainable design elements.



—
ABOVE

These diagrams illustrate storm water capture benefits of tree plantings and permeable pavers.

BIOSWALES

Bioswales are vegetated, mulched or xeriscaped channels that treat and retain stormwater as it transports stormwater from one place to another. Vegetated swales slow, infiltrate and filter stormwater flows. Because these features are linear, they are well suited to placement along streets and in parking lots where substantial automotive pollution is collected in stormwater runoff from the paving and then flushed by rain. The bioswale, or other type of biofilter, wraps around the parking lot and treats the runoff before releasing it to the watershed or storm drain system.

PERMEABLE PAVING AND PAVING ALTERNATIVES

Permeable paving and similar paving alternatives are paved surfaces that infiltrate, treat, and/or store rainwater where it falls. Permeable pavements may be constructed from pervious concrete, porous asphalt or permeable pavers and several other materials. Permeable paving consists of a range of sustainable materials with a base and sub-base that allow the movement of stormwater through the surface. Like permeable paving, porous asphalt consists of standard asphalt with reduced sand or fines that allows water to drain through it. Permeable pavers consist of interlocking concrete units designed with small openings between permeable joints, which allow stormwater to percolate.

These materials can replace traditional impervious pavement for most pedestrian and vehicular applications except high-volume/high-speed roadways. Examples include roads, paths, lawns, and lots that are subject to light vehicular traffic, such as car/parking lots, bicycle paths, service or emergency access lanes, road and airport shoulders, and residential sidewalks and driveways. The goal is to control stormwater at the source, reduce runoff and improve water quality by filtering pollutants in the substrate. More information can be found [here](#).

GREEN ROOFS

Green roofs refer to roofs that are covered either completely or partially with living vegetation that enable rainfall infiltration and evapotranspiration of stored water. Green roofs have many benefits including protecting the roof from sunlight, reducing stormwater runoff and pollution, reducing greenhouse gas emissions, improving air quality, and keeping buildings cooler as plants absorb the majority of the sun's energy. Green roofs contain a waterproof membrane, a drainage system, a thin layer of soil and plants. These types of roofs can be installed almost anywhere including residential, commercial, educational, and government buildings. Green roofs are particularly cost effective in dense urban areas where land values are high and on large industrial or office buildings where stormwater management costs may be high. Green roofs also help insulate buildings during the cold season.¹

TRANSPORTATION ALTERNATIVES

The City should continue to expand infrastructure to promote the use of alternative modes of transportation (e.g., bicycling, walking, carpooling, riding public transit) within the City instead of single-occupancy vehicles. Alternative modes of transportation can reduce traffic and air pollution, reduce fuel costs, promote healthy lifestyles and encourage community building and social networking. Thoughtful siting, configuration, and landscaping of parks and trails can encourage walking and bicycling over vehicle use.

BELOW

Urban forests can help promote the use of alternative transportation methods including public transportation, bicycling, and walking. The City has installed a new design for Nevin Avenue, turning it into a “complete street” through the addition of new lighting and landscaping, designated bicycle lanes, and roundabouts. Nevin Avenue also includes, bioswales, rain gardens and permeable paving that drains into stormwater blocks.



¹ <http://philadelphia.cbslocal.com/2013/11/19/green-roof-vs-cool-roof/>



ABOVE

Richmond residents working together to plant a raised planter bed at an urban greening event.

COMMUNITY GARDENS

Community gardens are parcels gardened collectively by a group of people. Community and individual gardens provide fresh produce and plants, enhance neighborhoods and provide participants with a connection to each other and the environment. Community gardens can range from small plots of vegetables to large greening projects intended to preserve natural areas. Gardens, particularly community gardens may help alleviate the effects of climate change, which may reduce the supply of agricultural goods. In addition, locally grown food

decreases a community's reliance on fossil fuels to transport food from large agricultural areas. As described in the City's Parks Master Plan, the community benefits from the use of public space for urban agriculture include a sense of ownership and stewardship, reductions in vandalism and crime, and improved health and well-being. The Parks Master Plan recommends that some park designs incorporate community gardens and identify parks that could accommodate farmer's markets.

DAYLIGHTING CREEKS AND HABITAT RESTORATION

The practice of "daylighting" returns some or all of a previously covered river, stream or drainage to its natural conditions by restoring it to an open surface channel. Daylighting of creeks and streams results in numerous benefits including increasing capacity of flood control, reducing downstream erosion, reducing sewer overflows, improving ecological function, improving water quality and enhancing recreation opportunities. The restoration of native plant communities and the creation of wildlife habitat are also important outcomes of this activity.

As described in the Parks Master Plan, a number of sites in the Richmond park system include natural creeks, or are directly adjacent to creek habitat. Some creeks have been buried or channelized as part of urban development. Creek habitat can be incorporated into the rehabilitation of park sites either by restoration of existing creek areas or by daylighting of underground creeks and restoring the habitat to a natural state. The City may identify other areas, in addition to its parks, where daylighting of creeks and/or restoration of creek habitat can be implemented.

UPDATED APPROVED STREET TREE LIST

In addition to providing valuable data on the existing urban forest in Richmond, the city-owned street tree inventory conducted in support of the Urban Greening Master Plan created an opportunity to review and update the Approved Street Tree List for the City of Richmond. Over the course of several months, the Urban Greening Master Plan Projects Advisory Group (PAG) met and reviewed the existing street tree list. The PAG included local experts, consulting arborists, and representatives from the City of Richmond Parks and Landscaping Division. This group developed a list of street trees suited to Richmond, including recommendations for selecting trees appropriate to the different microclimates that characterize Richmond's neighborhoods, and advisement regarding the selection of trees that are sensitive to the location of overhead utility lines. The list was expanded with the assistance of the Urban Forest Advisory Committee. A copy of this revised list is provided in Appendix A of this report and awaits City Council adoption.

A LOCALLY APPROPRIATE PLANT PALETTE

Because of their size and abundance, urban trees are often the focus of urban greening discussions; however, trees are just one part of a larger ecological system that includes smaller plants, wildlife, associated microorganisms, soil, and water. The landscaping around our homes and institutions, the vegetation in commercial and industrial areas, naturally occurring plants in our natural areas and the landscaping in our parks are also important to the greening of a community. While it is beyond the scope of this report to provide an all-inclusive list of plants for use in Richmond, the following outline of principles for plant selection as well as the guidelines referenced and best practices suggested will help to advance the goals and objectives of urban greening and establish a locally appropriate plant palette.

PRINCIPLES FOR GENERAL PLANT SELECTION

Plant the right plant in the right place. Understanding the mature size of a tree or shrub is critical to making a good selection. Plants and shrubs, especially those in the public right-of-way or adjacent to the public way should be given adequate room to grow to avoid overgrowth into sidewalks or paths, intrusion into underground wastewater lines and conflict with overhead utility lines.

- » **LOW WATER SPECIES** . The majority of plants in a landscape or garden should be species with lower water needs. Determine the water needs of plant species before planting. Less thirsty plants are encouraged wherever possible to minimize the use of water for irrigation purposes.

BELOW

The planting and irrigation project undertaken by the City of Richmond on the newly installed medians on Carlson Boulevard provide a case study of how construction techniques and plant selection can create green infrastructure and further the goals of urban greening.



Organic soil amendments from composted green waste was used to enrich the planting soil in the medians



Low flow bubbler style irrigation was used throughout the project. Irrigation in the median is controlled by a 'smart' controller equipped with weather sensors.



Cardboard sheet mulching was used to retain soil moisture and discourage weed growth. This practice reduces the need for herbicides more typically used for weed control.



A mixture of native and drought tolerant planting was combined with heavy layers of mulch to reduce water usage and minimize long term maintenance needs for the new planting.

There are many beautiful trees, shrubs and flowers with low water requirements. If plants with higher water requirements are desired, group them together so that they can be irrigated efficiently.

PLANTING RESOURCES

PLANT LISTS

- » **UC Davis Arboretum All-Stars.**
http://arboretum.ucdavis.edu/arboretum_all_stars.aspx
- » **Annie's Annuals Plant Lists.** http://www.anniesannuals.com/plt_lst/lists/browse/?totally-useful-plant-lists

PLANTS TO AVOID

- » **California Invasive Plant Council.**
<http://www.cal-ipc.org/paf/>
- » **Plant Right Invasive Plant List.**
<http://www.plantright.org/regions/north-and-central-coast>

BEST PRACTICES

- » **Bay Friendly Coalition Gardening Guide.** <http://www.bayfriendlycoalition.org/bfguidedetail.shtml>
- » **GardenSoft Waterwise Gardening.**
<http://www.sonoma.watersaving-plants.com/Garden-Resources/>
- » **UC Master Gardeners Garden Web.** http://cagardenweb.ucanr.edu/Landscape_Trees/

INTEGRATED PEST MANAGEMENT

- » **UC Master Gardeners IPM Online.**
<http://www.ipm.ucdavis.edu/PMG/menu.homegarden.html>

» **LOCATION IS CRITICAL.** Extensive research has been done for many years to determine the temperature ranges and other climatic conditions that can be tolerated by different plant species. These tolerances are generally described as hardiness and many guides exist that outline hardiness and sunset climate zones.² Within these zones there are areas known as microclimates, where the climate is affected by the surrounding area. Whether an area is sunny or shady, windy or protected, exposure will determine what plants will flourish and other factors such as the hedges, walls, and fencing, may offer protection that can alter growing conditions.

» **PLANT FOR WILDLIFE.** Plant for maximum landscape value. In addition to selecting plants for enjoyment of flowers, think about color and texture of leaves, bark and fruit, along with overall branching and shape. When possible, select species that support birds, insects, and other wildlife.

» **MAINTAIN PLANTING.** Maintenance is critical to long term planting success. Plants vary greatly in the amount of care required to keep them looking attractive. Select plants that realistically meet your gardening time constraints.

This report includes planting information resources in the adjacent chart in the form of web links that can assist Richmond residents in making informed planting decisions that further environmental stewardship and the goals of urban greening.

² According to the USDA Plant Hardiness Zone Map, Richmond is part of Zone 10 A with average annual extreme minimum temperatures of 30 to 35 °C.

5.03 FUNDING SOURCES

The majority of recommended actions provided in the Urban Greening Master Plan will require fundraising efforts to see initiation and reach completion. This section identifies both internal and external funding opportunities to advance Richmond's urban forest.

INTERNAL FUNDING SOURCES

IMPACT FEES

Impact fees are fees assessed and imposed by a local government on new development to cover the costs of providing City services. Impact fees are currently assessed for facilities and services such as roadways, sewer infrastructure, storm drainage, libraries, the police, community centers, and parks and open space. According to the City's Master Fee Schedule approved in July 2015, the fees assessed for parks and open space are \$5,996 per dwelling unit for residential single-family development and \$4,925 for residential multi-family development.

Action HW1.B of the 2030 General Plan recommends that the park impact fee ordinance be updated to cover the cost of parkland acquisition and improvement if the development is unable to provide adequate parkland within the project. A nexus study is required to update the criteria and fees.

CAPITAL IMPROVEMENT PROJECT BUDGETS

Capital improvement projects revitalize the community by improving infrastructure surrounding community assets such as affordable housing, educational facilities, transportation hubs, and creating attractive spaces for community use. Successful capital improvement projects are the result of partnerships between the City, the school district, foundations, National Park Service, CBOs, non-profits, and residents. Capital improvement projects present an opportunity to fund urban greening projects that improve public spaces by providing the aesthetic, environmental, economic and social benefits of urban greening. Including the costs of green infrastructure required in new or substantially rehabilitated streetscapes in capital improvement budgets is especially important in realizing opportunities to mitigate downstream costs of water treatment due to pollution.

EXTERNAL FUNDING SOURCES

HOUSING-RELATED PARKS PROGRAM

Administered by the California Department of Housing and Community Development, the Housing-Related Parks Program provides noncompetitive grant funding for park projects to jurisdictions that have documented housing starts for newly constructed or substantially rehabilitated housing units affordable to very low or low-income households. Funds are available once per year through an annual Notice of Funding Availability (NOFA).

While Housing-Related Parks grant funding is dependent on the number of units of affordable housing constructed for low and very low-income households, park projects receiving funds need not necessarily be connected to the housing development with the qualifying units. Program funds may be used for park improvement projects located within the City's boundaries.

HABITAT CONSERVATION FUND PROGRAM

Administered by the California Department of Parks and Recreation Office of Grants and Services, the Habitat Conservation Program was established by the California Wildlife Protection Act of 1990 through Proposition 117. The Program provides funds to local entities to protect threatened species, address wildlife corridors, create trails, and provide for nature interpretation programs which bring urban residents into park and wildlife areas. Cities, counties and districts are eligible to receive funding from this competitive grant program. The program has a matching requirement of 50% dollar per dollar match from grantees.

ACTIVE TRANSPORTATION PROGRAM (ATP)

Administered by the California Department of Transportation, the Active Transportation Program (ATP) consolidates existing federal and state transportation programs, including the Transportation Alternatives Program (TAP), Bicycle Transportation Account (BTA), and State Safe Routes to School (SR2S), into a single program with a focus to make California a national leader in active transportation. The ATP is administered by the Division of Local Assistance, Office of Active Transportation and Special Programs. Fifty percent of annual ATP funding is awarded to eligible entities on a competitive basis.

ENVIRONMENTAL ENHANCEMENT AND MITIGATION (EEM) PROGRAM

Administered by the California Natural Resources Agency, the Environmental Enhancement and Mitigation Program offers competitive grant funding to qualifying entities for projects that are either directly or indirectly related to the environmental impact of the modification of an existing transportation facility, or the construction of a new transportation facility. The Program especially encourages projects that yield multiple environmental benefits, such as reduced greenhouse gas emissions, improved water use efficiency and reduced risks from climate change. The program allocated \$7 million annually to selected projects. Grants are awarded in three categories, including Urban Forestry Projects, Resource Lands Projects, and Mitigation Projects Beyond the Scope of the Lead Agency.

URBAN AND COMMUNITY FORESTRY (UCF) PROGRAM

Administered by the California Department of Forestry and Fire Protection (CalFire), the Urban and Community Forestry Program is part of the Natural Resources and Waste Diversion Division of the California Climate Investments Program (CCIP), formerly known as the Greenhouse Gas Reduction Fund (GGRF). The program funds five projects to reduce greenhouse gas emissions by increasing green space, improving the health of and expanding urban forestry, reducing waste, fostering sustainable local food systems, and adopting green infrastructure. Currently, the program allocates 100% of overall funding for benefits to Disadvantaged Communities (DACs) as mandated by SB 535. The Governor's Budget Act of 2014 assigned \$42 out of \$872 million in funds,³ which are allocated on an annual and competitive basis by CalFire. Projects must also be in compliance with the Urban Forestry Act of 1978.

³ Granted projects must further the goals of AB 32, the Global Climate Warming Solution Act and strategies contained in the Air Resources Board Updated Scoping Plan.

SOCIAL EQUITY TREE PLANTING GRANT PROGRAM

Administered by California ReLeaf, the Social Equity Tree Planting Program brings trees and the greenhouse gas reduction benefits of trees to Disadvantaged Communities (as defined by CalEnviroScreen 2.0) by supporting nonprofit and community-based organizations with more funding cycles for urban tree planting projects. For 2016, the program distributed nearly \$1 million on a competitive basis. The program supports the objectives of AB 32 and SB 535.

PLANTING WITH PURPOSE GRANT PROGRAM

Also administered by California ReLeaf, the Planting with Purpose Grant program provides funding for innovative greening projects that go beyond street tree planting to support community gardens, urban orchards, green roofs, among other initiatives. This is an opportunity for incorporated nonprofit organizations and unincorporated community-based groups (with a fiscal sponsor) that are located in California (tree advisory boards also qualify). Although the City of Richmond does not qualify as a beneficiary of the older program Green Trees for the Golden State, this is an exciting opportunity for organizations based in Richmond to secure public funds. The first grant will be released in 2016.

ENVIRONMENTAL JUSTICE SMALL GRANTS

Administered by the California Environmental Protection Agency, the Environmental Justice Small Grant awards up to \$50,000 to eligible community groups and federally recognized Tribal governments to address environmental justice issues in communities disproportionately affected by environmental pollution by improving access to safe and clean water, reducing risk of exposure, promoting community capacity building and understanding of environmental decision-making procedurals, promote community-based research enhancing public health and the environment, reducing cumulative impacts through collaboration between community-based organizations and local governments. Most recently, Cal EPA expanded a climate change category of this program to support community led initiatives that provide public health benefits. Such projects include energy efficiency, community greening, water conservation, and increased walking and biking.

AFFORDABLE HOUSING AND SUSTAINABLE COMMUNITIES PROGRAM (AHSC)

Administered by the Strategic Growth Council, the Affordable Housing and Sustainable Communities Program provides competitive grant funding for compact transit-oriented development and related infrastructure projects that reduce greenhouse gas emissions. Projects that are eligible for funds reduce air pollution, provide benefits to Disadvantaged Communities (DACs), improve public health, increase mobility, and improve access to employment, housing and other services. Rainwater cycling, infiltration and bioretention systems, storm water planters, vegetated swales, community gardens, and open space exemplify some of the granted awards.

STORMWATER MANAGEMENT PROGRAM

Administered by the California Water Resources Control Board, the Stormwater Management Program funds multi-benefit stormwater management projects, including green infrastructure, rain water capture proposals, and stormwater treatment facilities. Funds come from Proposition 1⁴ (Assembly Bill 1471, Rendon) and award up to five projects, for a total of \$200 million of available funding, to public agencies and nonprofit organizations. Richmond needs to prepare a Storm Water Resource Plan as required by Senate Bill 985⁵ to be eligible for Prop 1 funding.

MEASURE AA

The passage of the Clean and Healthy Bay Initiative, Measure AA, will provide funding to restore the San Francisco Bay's wetlands and help protect the region from the effects of rising seas. This entails a \$12 annual parcel tax that would be distributed among all parcels in the nine-county Bay Area. Over the next 20 years, Measure AA will raise \$500 million to restore wildlife habitat, improve water quality, and create a buffer against storms and sea level rise.



ABOVE aAdopt-A-Tree planting and greening events in Richmond.

5.04 FEATURED PROJECTS

RICHMOND ADOPT-A-TREE PROGRAM

Richmond's Adopt-a-Tree program provides Richmond residents and property owners with the opportunity to have a tree planted in front of their property free of charge. The current program relies on successful partnership between Richmond residents, community groups, and the Parks and Landscaping Division. Currently, the Parks and Landscaping Division oversees the application process and provides planting and maintenance resources to street tree owners. Community groups have been instrumental in preparing adopt-a-tree sites for planting by providing concrete removal services. The resident agrees to water the tree and ensure that the tree stakes and ties remain intact providing adequate support for the tree.

Applicants to the Adopt-a-Tree Program can choose between an evergreen (green all year) or deciduous (lose their leaves in the fall) tree. The City reviews residents' applications, evaluates the potential planting area, and schedules the tree planting. Richmond's Mediterranean climate, characterized by cool, dry summers and warm, wet winters, results in an ideal tree planting period of October through March. Warm winter weather is optimal for root growth and healthy tree establishment. For the resident and caretaker of the tree, the winter rains are typically adequate to sustain the tree and reduce the amount of watering required. The Adopt-a-Tree program website contains a link to the Adopt-a-Tree guide, which provides information about the benefits of trees, City tree planting goals, planting diagrams, as well as guides pertaining to tree staking, watering, fertilizing and pruning.

4 Prop 1 (Assembly Bill 1471, Rendon) authorized \$7.545 billion in general obligation bonds for water projects including surface and groundwater storage, ecosystem and watershed protection and restoration, and drinking water protection.

5 http://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=2013201405B985

HARBOUR-8 PARK

In partnership with Pogo Park, the Watershed Project and the Restoration Design Group, the Trust for Public Land recently received a \$75,000 grant from the Strategic Growth Council to plant bioswales along Harbour-8 Park, a two-block section of the Richmond Greenway, part of the Pogo Park adopt-a-spot initiative on the Greenway. The bioswales are anticipated to be planted in Fall 2016. In addition to bioswales, the transformation of Harbour-8 will include the installation of a community garden and tree planting opportunities.



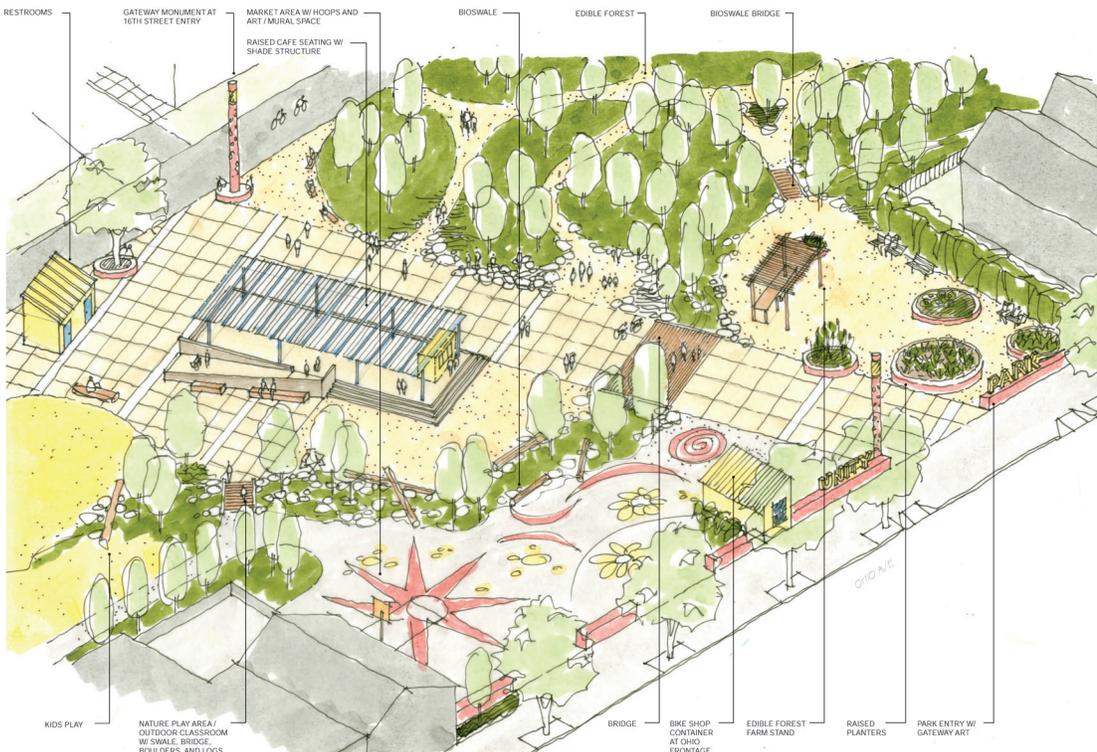
ABOVE

Illustration of proposed Harbour-8 Park

UNITY PARK

Unity Park presents one example of a successful community partnership in Richmond that will deliver many benefits of urban greening to City residents and visitors. Located along several multiple-block segments of Ohio Avenue in Richmond's Iron Triangle neighborhood, plans for Unity Park include the installation of green infrastructure, such as bioswales, an edible forest, a Native American Health Center Garden, Honey Bee Health Garden, native meadow, and an outdoor classroom. Unity Park is a microcosm of the many different forms and benefits of urban greening improvements that the City hopes to achieve in all Richmond neighborhoods. The development of Unity Park has been funded in large part by a \$5 million grant from the State of California Parks Department. According to Friends of the Richmond Greenway, a group of 17 member organizations working to "transform the Richmond Greenway into a beautiful and healthy space that meets the diverse needs of the community," the objective of the Unity Park project is to deliver resources and greening benefits to surrounding areas while "uplifting years of community efforts to truly activate the space."⁶

LEFT Illustration of proposed Unity Park, 16 Street plaza and edible forest



6 Friends of the Richmond Greenway. "Unity Park." Accessed 4/5/16. <http://www.richmondgreenway.org/index.php/about/>; Friends of the Richmond Greenway 2014 Identity Statement Approved March 3, 2014. Accessed 4/10/16. < <http://www.richmondgreenway.org/wp-content/uploads/2015/10/FinalOrganizationalDocuments5.5.14.doc.pdf>>

GREENING URBAN WATERSHEDS

Founded in 1997, The Watershed Project operates out of the UC Berkeley Richmond Field Station with a vision of “people committed to a healthy San Francisco Bay watershed.”⁷ The Watershed Project hosts frequent events to foster stewardship of the San Francisco Bay, including many of Richmond’s sensitive and/or polluted natural areas. One of the Watershed Project’s chief initiatives, Greening Urban Watersheds, has led to several successful greening projects in Richmond, including the Richmond Greenway Habitat Garden and Bioswale Project, clean-up and restoration projects at Baxter Creek and Brooker T. Anderson Park, as well as a three-day Meeker Slough clean up action in Marina Bay, which resulted in the removal of hundreds of pounds of accumulate rubbish from the slough in an effort to restore the Bay. The Watershed Project has also worked to restore reefs and oyster beds on Richmond’s north shoreline as part of their Living Shoreline Initiative. The Watershed Project’s integration of education in urban greening efforts highlights the value of community stewardship in successfully expanding Richmond’s urban forest.

BEFORE

Alley in Mathieu Court



AFTER

Renovated Alley in Mathieu Court.

photo credit Kieron Slaughter, 2016

MATHIEU COURT

Mathieu Court is Richmond’s first green alley and presents an example of Richmond’s recent progress in incorporating green infrastructure and expanding the City’s urban forest. Mathieu Court is an approximately 16,000 square foot, paved alley in Richmond’s Iron Triangle neighborhood. Once a site of garbage dumping, the alley has been renovated and reclaimed to provide the neighborhood with the environmental, aesthetic and social benefits of urban greening. The long stretch of impervious pavement was replaced with drought-sensitive landscaping, pervious pavers, and Turf Cell where vehicle access is necessary. The installment of permeable surfaces and native plants is intended to provide the ecosystem services of natural systems, such as management of stormwater runoff, recharging groundwater reservoirs, and creating new habitat for native birds and beneficial insects. In addition, young trees have been established in the now-landscaped corridors to expand the neighborhood’s tree canopy coverage while yielding the shading and traffic calming benefits of trees in the urban landscape.

ARBOR DAY AND TREE CITY USA DESIGNATION

Arbor Day was first recognized over 135 years ago as a day dedicated to planting and celebrating the benefits of trees by the Arbor Day Foundation. To support the urban forest, Richmond celebrates Arbor Day and participates in the Tree City USA program. The Arbor Day Foundation provides information on the benefits of urban trees, including identification guides, educator resources, and tree-themed gift and celebration inspiration. Richmond earned Tree City USA designation in 2009. To be considered for this special designation, a City must meet four requirements:

7 The Watershed Project. “Who We Are.” 2016. Accessed 4/10/16. <http://www.thewatershedproject.org/WhoWeAre/WhoWeAre.html>

1. Create and maintain a tree board or department;
2. Create and uphold a tree care ordinance;
3. Provide funding for a community forestry program; and,
4. Observe and celebrate Arbor Day, a special tree planting day.

Part of the development of the Urban Greening Master Plan was the reappointment of the Urban Forest Advisory Committee, a group of citizens passionate about the expansion and maintenance of Richmond's urban forest. The City's Tree City USA designation is also important for raising funds for urban greening projects. By continuing to uphold these four standards and maintain its Tree City USA designation, the City of Richmond will be eligible to secure regional and national grants to support the urban forest.

5.05 CONCLUSION

As Richmond becomes more densely developed, a greater need arises to maintain, protect, and manage the urban forest. The urban forest is a complex system of trees and smaller plants, wildlife, associated organisms, soil, water, and air located in and around the City. It includes the trees along the streets, landscaping around homes and institutions, the vegetation in commercial and industrial areas, the multilayered forests in our natural areas and the plants and landscaping in our parks. As an important green infrastructure system the urban forest is a significant community asset. In addition to generating social and economic benefits, the urban forest provides environmental services such as improved water and air quality. It also enhances the local climate by providing cooling and shading and improves the ecological health of the urban environment.

A healthy urban forest is essential to the quality of life of the City's residents and increasingly important to the City's efforts to improve the quality of the environment. The Richmond Urban Greening Master Plan is a roadmap for a strategic approach to managing Richmond's urban forest, providing goals and recommendations to conserve, maintain and expand the City's urban forest, to build on and support other planning efforts to promote the City's broader sustainability goals, and to foster community involvement and stewardship for the City's urban forest.

BELOW Arbor Day planting and greening event in Richmond.



"...Tree-planting groups and volunteers in Richmond are continuing to positively change the future of the city, improving the social and environmental state of the community by planting trees."

REBEKAH MAGILL,

ARBOR DAY FOUNDATION

<http://blog.arborday.org/author/rmagill/>



APPENDIX A

APPROVED STREET TREE LIST

The approved street tree list for Richmond was developed with input from the Project Advisory Group (PAG) to the Urban Greening Master Plan. Additional trees have been added to the original PAG list. Cultural information was obtained from numerous sources, primarily the **Urban Forest Ecosystems Institute** and the *Sunset Western Garden Book*.

	Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas	Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
APPROVED SPECIES FOR PLANTING AREAS 2' TO 3' IN WIDTH																	
*	Acer buergerianum	trident maple	Deciduous	25' to 30'	25'	25'	X	Moderate		Susceptible to aphids, root rots, and Verticillium wilt.	Wide texture and pH tolerance.	Limited structural training required as young tree.	Low	Red/orange fall color	Moderate to Fast	Oval to rounded form	Best in 3' or larger planting area. Variety 'Streetwise' is an improved selection, although availability may be limited.
*	Acer campestre 'Queen Elizabeth'	hedge maple 'Queen Elizabeth'	Deciduous	25' to 30'	30'	25'	X	Moderate	Central Richmond, Richmond Annex, Marina, Hilltop	Susceptible to Verticillium wilt and tar spot (Rhytisma acerinum).	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Low	Yellow fall color	Slow	Round-global	
	Acer palmatum	Japanese maple	Deciduous	25' to 30'	20'	25'	X	Moderate		Susceptible to aphids, root rots, and Verticillium wilt.	Acid to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Low	Red/orange/yellow	Moderate	Rounded to spreading form	Verticillium wilt is most significant issue. Nursery trees can be infected when shipped.
	Acer tataricum subsp. ginnala 'Flame'	Flame amur maple	Deciduous	20' to 25'	20'	20'	X	Moderate		Reported resistant to oak root fungus.	Acid to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Low	Red/orange fall color	Moderate	Oval	
	Agonis flexuosa	peppermint tree	Evergreen	25' to 30'	30'	25'				Susceptible to Phytophthora and root rots.	Tolerant to alkaline soils.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Showy, white flowers in summer.	Moderate to Fast	Generally rounded form.	Freezes at 25°F. Best in 3' or larger planting area.
	Callistemon citrinus	lemon bottlebrush	Evergreen	20' to 25'	25'	15'	X	Low		Few problems. Occasional iron chlorosis.	Acidic to alkaline soils. Requires adequate drainage.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy red flowers in spring and summer.	Fast	Oval to rounded form	Attracts hummingbirds.
	Callistemon viminalis	weeping bottlebrush	Evergreen	20' to 25'	25'	15'	X	Low		Susceptible to Mites and Insect Galls, Root Rot, Canker and Witches Broom	Acidic to alkaline soils. Requires adequate drainage.	Training and periodic maintenance required to maintain appropriate structure.	Low	Red flowers	Moderate	Weeping form.	Attracts hummingbirds.

*Trees marked with an asterisk are current Richmond street trees.

Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas	Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
Cassia leptophylla	gold medallion tree	Evergreen to partly deciduous	25' to 30'	25'	25'	X	Low		Few problems reported.	Well drained soils. Neutral to slightly alkaline soils.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy yellow flowers in summer.	Fast	Rounded to umbrella shape.	Seeds are poisonous. Subject to freeze damage in colder areas. Experimental status.
Cercis reniformis 'Oklahoma'	Oklahoma redbud	Deciduous	30' to 35'	15'	15'	X	Low		Reported susceptible to scale, canker, leaf spot, and Verticillium wilt in other parts of the US.	Acidic to alkaline soils. Requires adequate drainage.	Requires only limited pruning.	Low	Showy pink flowers in spring.	Moderate	Rounded to vase shaped.	
Chilopsis linearis	desert willow	Deciduous	25' to 30'	25'	25'	X	Very Low		Susceptible to Phytophthora and root rots. Not tolerant of coastal conditions.	Neutral to alkaline soils. Requires good drainage in loam or sandy soils.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy pink flowers in spring.	Moderate to Fast	Rounded to umbrella shape.	Experimental status as street tree. Use away from coastal areas.
Chionanthus retusus	Chinese fringe tree	Deciduous	20' to 25'	20'	20'	X	Moderate		Few problems reported.	Acid to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil is well-drained.	Requires only limited pruning.	Low	Showy white flowers in spring.	Moderate	Rounded to umbrella shape.	
Crataegus phaenopyrum	Washington hawthorn	Deciduous	25' to 30'	30'	25'	X	Moderate		Susceptible to aphids, scale, root rots, and occasional rust. Most resistant hawthorn to fire blight.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Low	White flowers, red fruit, and red to orange fall color.	Moderate	Rounded to vase shaped.	Has sharp thorns that can be a safety issue in small planters.
Eriobotrya deflexa	bronze loquat	Evergreen	20' to 25'	20'	20'	X	Moderate		Susceptible to fireblight.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Low	White flower display and interesting foliage form and color.	Moderate to Fast	Rounded to umbrella shape.	
Koelreuteria paniculata	golden rain Tree	Deciduous	30' to 35'	30'	30'	X	Moderate	Central Richmond, Richmond Annex, Marina, El Sobrante, Hilltop	Susceptible to scale, root rots, and boring insects when drought stressed.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Low	Yellow fall color	Slow to Moderate	Rounded to vase shaped.	

*Trees marked with an asterisk are current Richmond street trees.

	Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas	Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
	Lagerstroemia x fauriei 'Biloxi'	pink crape myrtle 'Biloxi'	Deciduous	25' to 30'	30'	20'	X	Low	Central Richmond, El Sobrante	Resistant to powdery mildew. Susceptible to aphids.	Acidic to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Requires only limited pruning.	Low	Showy summer flower display. Red/orange/yellow fall color	Slow to Moderate	Oval, rounded, or vase shaped.	
	Lagerstroemia x fauriei 'Muskogee'	lavender crape myrtle 'Muskogee'	Deciduous	25' to 30'	30'	20'	X	Low	Central Richmond, El Sobrante	Resistant to powdery mildew. Susceptible to aphids.	Acid to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Requires only limited pruning.	Low	Showy summer flower display. Red/orange/yellow fall color	Slow to Moderate	Oval, rounded, or vase shaped.	
*	Lagerstroemia x fauriei 'Natchez'	white crape myrtle 'Natchez'	Deciduous	25' to 30'	30'	20'	X	Low	Central Richmond, El Sobrante	Resistant to powdery mildew. Susceptible to aphids.	Acidic to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Requires only limited pruning.	Low	Showy summer flower display. Red/orange/yellow fall color	Slow to Moderate	Oval, rounded, or vase shaped.	
	Lagerstroemia x fauriei 'Tuscarora'	coral crape myrtle 'Tuscarora'	Deciduous	25' to 30'	30'	20'	X	Low	Central Richmond, El Sobrante	Resistant to powdery mildew. Susceptible to aphids.	Acidic to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Requires only limited pruning.	Low	Showy summer flower display. Red/orange/yellow fall color	Slow to Moderate	Oval, rounded, or vase shaped.	
	Lagunaria patersonii	primrose tree	Evergreen	25' to 30'	30'	35'		Low		Susceptible to Phytophthora and root rots.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy flowers in summer and fall.	Fast	Oval	Tolerates wind, salt, and smog.
	Laurus 'Saratoga'	Saratoga laurel	Evergreen	30' to 35'	35'	30'		Low		Resistant laurel psyllid. Susceptible to scale.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Low	Dark green, fragrant foliage.	Slow to Moderate	Conical to oval shape.	

*Trees marked with an asterisk are current Richmond street trees.

	Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas		Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
	Magnolia grandiflora 'Little Gem'	southern magnolia 'Little Gem'	Evergreen	20' to 25'	25'	15'	X	Moderate	Central Richmond		Susceptible to aphids, scale, root rots, spider mites and Verticillium wilt. Resistant to oak root fungus.	Acidic to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Requires only limited pruning.	Moderate	Showy white flowers and reddish purple fruit.	Slow	Oval to rounded form.	
	Magnolia soulangeana 'Alexandrina'	saucer magnolia 'Alexandrina'	Deciduous	25' to 30'	25'	25'	X	Moderate			Susceptible to aphids, scale, root rots, spider mites and anthracnose.	Acidic to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy pink/purple flowers in spring.	Moderate	Rounded to vase shaped.	
	Melaleuca linariifolia	flax-leaf paperbark	Evergreen	25' to 30'	30'	25'	X	Low	Central Richmond, El Sobrante, Hilltop		Susceptible to Phytophthora and root rots.	Acidic to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy, white flowers in summer.	Moderate to Fast	Oval to rounded form.	Best in 3' or larger planting area.
	Melaleuca quinquenervia	cajeput tree	Evergreen	30' to 35'	35'	25'		Low			Susceptible to Phytophthora and root rots.	Acidic to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy, white flowers in summer and fall.	Moderate	Oval to rounded form.	Best in 3' or larger planting area.
	Nerium oleander (std.)	oleander tree form	Evergreen	20' to 25'	15'	10'	X	Low			Susceptible to aphids and scale.	Slightly acid to strongly alkaline pH tolerance. Adaptive to many soil types.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy, white flowers in summer and fall.	Moderate to Fast	Oval to rounded form.	Plant parts are poisonous.
*	Prunus cerasifera 'Krauter Vesuvius'	purple leaf plum 'Krauter Vesuvius'	Deciduous	25' to 30'	20'	20'	X	Low	Central Richmond		Susceptible to aphids, scale, root rots, spider mites and Verticillium wilt.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Low	Pink flowers in spring. Purple foliage.	Moderate	Oval to rounded form.	

*Trees marked with an asterisk are current Richmond street trees.

	Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas		Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
	Prunus x yedoensis 'Akebono'	Akebono flowering cherry	Deciduous	25' to 30'	25'	25'		Moderate			Susceptible to Phytophthora and root rots.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy pink flowers in spring.	Moderate	Rounded to umbrella shape.	
	Pyrus calleryana 'Chanticleer'	Chanticleer flowering pear	Deciduous	30' to 35'	35'	20'		Moderate	Central Richmond, Richmond Annex, Marina		One of the more fireblight resistant selections. Occasional white fly infestations.	Wide texture and pH tolerance.	Requires only limited pruning.	Moderate	Showy, white flowers in spring. Red to burgundy fall foliage color.	Moderate to Fast	Narrow, columnar form.	Best in 3' or larger planting area.
	Pyrus kawakamii	Chinese evergreen pear	Evergreen	25' to 30'	25'	20'		Moderate			Susceptible to aphids, white fly, and fire blight.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy white flowers in spring.	Moderate to Fast	Rounded to umbrella shape.	Best in 3' or larger planting area.
*	Quillaja saponaria	soapbark tree	Evergreen	20' to 25'	35'	20'		Low			No significant pest or disease problems reported.	Limited information on soil tolerances. Reportedly adaptable to poor soils.	Training and periodic maintenance required to maintain appropriate structure.	Low	Pale yellow to creamy flowers in spring.	Slow	Upright, narrow form.	Experimental status as street tree.
	Rhaphiolepis 'Majestic Beauty'	Majestic Beauty Indian hawthorn	Evergreen	20' to 25'	20'	10'		Low			Susceptible to aphids, root rot, Verticillium wilt, and fire blight.	Slightly acid to strongly alkaline pH tolerance. Adaptive to many soil types.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy pink flowers in fall winter, and spring.	Moderate	Rounded to vase shaped.	
	Sercia lancea (Rhus lancea)	African sumac	Evergreen	30' to 35'	30'	25'		Low			Susceptible to root rots and Verticillium wilt.	Slightly acid to strongly alkaline pH tolerance. Adaptive to many soil types.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Flowers are inconspicuous.	Moderate	Rounded to umbrella shape.	Best in 3' or larger planting area.
*	Tristanopsis laurina 'Elegant' (Tristania laurina)	Elegant water gum	Evergreen	25' to 30'	30'	20'		Moderate	Central Richmond, El Sobrante, Hilltop, Pt. Richmond		Susceptible to scale.	Neutral to moderately alkaline soils. Tolerant of most soil textures.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy yellow flowers in spring and summer.	Slow	Oval to rounded form	Strongly attractive to bees when in bloom.

*Trees marked with an asterisk are current Richmond street trees.

Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas	Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
APPROVED SPECIES FOR PLANTING AREAS 4' TO 6' IN WIDTH																
Acer rubrum 'October Glory'	red maple 'October Glory'	Deciduous	35' to 40'	45'	35'		Moderate	Central Richmond, El Sobrante	Susceptible to aphids, scale, root rots, boring insects and leaf spot.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain single trunk structure.	Moderate	Dependable fall color.	Moderate	Oval to rounded form.	
* Acer rubrum 'Red Sunset'	red maple 'Red Sunset'	Deciduous	35' to 40'	45'	35'		Moderate	Central Richmond	Susceptible to aphids, scale, root rots, boring insects and leaf spot.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain single trunk structure.	Moderate	Dependable fall color.	Moderate	Oval to rounded form.	
Aesculus x carnea	red horsechestnut	Deciduous	35' to 40'	40'	30'		Moderate	Central Richmond, El Sobrante	Susceptible to boring insects, chlorosis. powdery mildew and rust.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain single trunk structure.	Low	Showy red flowers in spring.	Moderate	Rounded to umbrella form.	Fruit is poisonous.
Afrocarpus gracilior	African fern pine	Evergreen	25' to 30'	30'	20'		Moderate		No significant pest or disease problems reported.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain single trunk structure.	Moderate	Dark green, fine-textured foliage. No significant flower display.	Moderate	Oval to rounded form.	
Carpinus betulus 'Fastigiata'	pyramidal European hornbeam	Deciduous	35' to 40'	50'	40'		Moderate	Central Richmond, El Sobrante	Susceptible to scale, root rots, and boring insects when drought stressed.	Adaptive to many soil types as long as the soil to well-drained. Not tolerant of alkaline soils.	Requires only limited pruning.	Low	Yellow fall color	Moderate	Usually columnar form, spreading with age.	
Chitalpa tashkentensis	chitalpa	Deciduous	30' to 35'	30'	30'		Low		Susceptible to aphids, root rots, powdery mildew, and Verticillium wilt.	Slightly acid to high alkaline pH tolerance. Loam or sandy soils.	Training and periodic maintenance required to maintain single trunk structure.	Low	Showy flowers in spring, summer, and fall.	Fast	Rounded to umbrella form.	May be prone to powdery mildew in areas close to bay. Flower debris may be maintenance issue.
Chitalpa tashkentensis 'Morning Cloud'	Morning Cloud chitalpa	Deciduous	30' to 35'	30'	30'		Low		Susceptible to aphids, root rots, powdery mildew, and Verticillium wilt.	Slightly acid to high alkaline pH tolerance. Loam or sandy soils.	Training and periodic maintenance required to maintain single trunk structure.	Low	Showy flowers in spring, summer, and fall.	Fast	Rounded to umbrella form.	May be prone to powdery mildew in areas close to bay. Flower debris may be maintenance issue.

*Trees marked with an asterisk are current Richmond street trees.

	Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas		Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
	Chitalpa tashkentensis 'Pink Dawn'	Pink Dawn chitalpa	Deciduous	30' to 35'	30'	30'		Low			Susceptible to aphids, root rots, powdery mildew, and Verticillium wilt.	Slightly acid to high alkaline pH tolerance. Loam or sandy soils.	Training and periodic maintenance required to maintain single trunk structure.	Low	Showy flowers in spring, summer, and fall.	Fast	Rounded to umbrella form.	May be prone to powdery mildew in areas close to bay. Flower debris may be maintenance issue.
	Ginkgo biloba 'Saratoga'	ginkgo tree 'Saratoga'	Deciduous	30' to 35'	35'	30'		Moderate	Richmond Annex		Susceptible to Verticillium wilt. Resistant to oak root fungus.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil is well-drained.	Training and periodic maintenance required to maintain single trunk structure.	High	Brilliant yellow fall color.	Slow to Moderate	Oval to rounded form.	
	Jacaranda mimosifolia	jacaranda	Deciduous to partly deciduous	35' to 40'	40'	30'		Moderate			Susceptible to aphids and root rots.	Slightly acid to moderate alkaline pH tolerance. Loam or sandy soils.	Training and periodic maintenance required to maintain single trunk structure. Tendency to weak branch structure.	Moderate	Showy blue flowers spring into fall.	Moderate	Oval to rounded form.	Flower debris may be maintenance issue. Needs warm temperatures to flower. Young trees freeze at 25°F.
*	Lophostemon confertus (Tristania conferta)	Brisbane box	Evergreen	35' to 40'	40'	35'		Moderate	Central Richmond, Richmond Annex, El Sobrante, Hilltop, Pt. Richmond		Susceptible to scale, Phytophthora and root rots.	Slightly acid to highly alkaline pH tolerance. Adaptive to many soil types as long as the soil is well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Showy white flowers in spring. Interesting multi-colored bark.	Moderate to Fast	Oval to rounded form.	
	Magnolia grandiflora 'Majestic Beauty'	Southern magnolia 'Majestic Beauty'	Evergreen	35' to 40'	40'	35'		Moderate			Susceptible to aphids, scale, root rots, spider mites and Verticillium wilt. Resistant to oak root fungus.	Wide texture and pH tolerance.	Limited pruning requirements.	High	Showy white flowers and reddish purple fruit.	Moderate	Conical to oval form.	
	Magnolia grandiflora 'Samuel Sommers'	Southern magnolia 'Samuel Sommers'	Evergreen	35' to 40'	40'	30'		Moderate			Susceptible to aphids, scale, root rots, spider mites and Verticillium wilt. Resistant to oak root fungus.	Wide texture and pH tolerance.	Limited pruning requirements.	High	Showy white flowers and reddish purple fruit.	Moderate	Oval to rounded form.	

*Trees marked with an asterisk are current Richmond street trees.

	Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas	Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
*	Magnolia grandiflora 'Saint Mary'	southern magnolia 'Saint Mary'	Evergreen	20' to 25'	25'	20'	X	Moderate	Central Richmond, El Sobrante	Susceptible to aphids, scale, root rots, spider mites and Verticillium wilt. Resistant to oak root fungus.	Acid to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Requires only limited pruning.	Moderate	Showy white flowers and reddish purple fruit.	Slow	Oval to rounded form.	
*	Metrosideros excelsa	New Zealand Christmas tree	Evergreen	30' to 35'	30'	30'	X	Low	Central Richmond, Richmond Annex, Marina, Hilltop, Pt. Richmond	Susceptible to Phytophthora and root rots.	Neutral to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain single trunk structure.	Moderate	Showy red flowers in summer.	Moderate	Oval to rounded form.	
	Olea europaea 'Swan Hill'	fruitless European olive	Evergreen	25' to 30'	25'	25'		Low		Susceptible to aphids, scale, root rots, spider mites and Verticillium wilt.	Slightly acid to highly alkaline pH tolerance. Adaptive to many soil types as long as the soil is well-drained.	Variable pruning requirements depending upon whether tree is a multiple trunk or single trunk form.	Moderate	Olive green foliage. Fruitless selection.	Moderate	Rounded to vase shape.	Fruitless selection. Often expensive compared to other tree species.
*	Pistacia chinensis	Chinese pistache	Deciduous	35' to 40'	45'	40'		Low	Central Richmond, El Sobrante, Hilltop	Susceptible to root rots and Verticillium wilt. Resistant to oak root fungus.	Slightly acid to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Early training and occasional maintenance required to maintain appropriate structure.	Moderate	Red/orange fall color	Moderate	Oval to rounded form.	Male selection 'Keith Davies' offers superior and consistent characteristics.
	Pittosporum undulatum	Victorian box	Evergreen	35' to 40'	40'	30'		Low		Susceptible to aphids, scale, and sooty molds.	Slightly acid to moderate alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Early training and occasional maintenance required to maintain appropriate structure.	Moderate	Showy, fragrant, white flowers in spring.	Moderate to Fast	Oval to rounded form	
*	Quercus suber	cork oak	Evergreen	35' to 40'	70'	60'		Low	Richmond Annex, El Sobrante, Pt. Richmond	Susceptible to Phytophthora and root rots.	Prefers loam to clay soil, needs good drainage. Drought tolerant.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Interesting bark texture.	Moderate to Fast	Oval to rounded, or umbrella form.	Bark is subject to vandalism. Same species used for cork production.

*Trees marked with an asterisk are current Richmond street trees.

	Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas		Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
*	Quercus virginiana	Southern live oak	Semi-evergreen	70' to 80'	60'	80'		Moderate	Richmond Annex, El Sobrante		Susceptible to Phytophthora and root rots.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Flowers are inconspicuous.	Moderate to Fast	Oval to rounded, or umbrella form.	
	Schinus terebinthifolius	Brazilian pepper	Evergreen	35' to 40'	30'	30'		Moderate			Susceptible to aphids, scale, root rots, and Verticillium wilt.	Slightly acid to highly alkaline pH tolerance. Best in loam or sandy soils.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	White flowers in summer with red berry like fruit.	Moderate	Umbrella form.	Form can be variable. Select well-structured trees.
	Styphnolobium japonicum 'Regent' (Sophora japonica)	Japanese pagoda tree	Deciduous	30' to 35'	30'	25'		Low	Central Richmond, Richmond Annex, El Sobrante, Hilltop		Susceptible to leafhoppers, canker, twig blight, and powdery mildew.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy yellow to white flowers in summer.	Moderate	Rounded.	Seeds are poisonous.
	Tipuana tipu	tipu tree	Deciduous	35' to 40'	45'	40'		Moderate			No significant pest or disease problems reported.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Showy yellow or orange flowers in summer.	Moderate to Fast	Oval to rounded, or umbrella form.	Needs warm temperatures to flower, best away from bay. Young trees freeze at 25°F.
	Triadica sebiferum (Sapium)	Chinese tallow tree	Deciduous	30' to 35'	35'	30'	X	Moderate	Central Richmond, El Sobrante		Resistant to oak root fungus. Few other pest or disease problems.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain single trunk structure.	Moderate to High	Yellow, red, and orange fall color.	Moderate to Fast	Conical to oval form.	Heavy tendency to sucker. Needs regular pruning maintenance.
*	Ulmus hybrid 'Frontier'	Frontier elm	Deciduous	35' to 40'	40'	30'		Low	Central Richmond, El Sobrante		Resistant to Dutch elm disease and elm yellows. Moderate resistant to elm leaf beetle.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Reddish-purple fall color.	Moderate to Fast	Vase shaped crown form.	Tolerates heat and drought.

*Trees marked with an asterisk are current Richmond street trees.

Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas	Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
APPROVED SPECIES FOR PLANTING AREAS OVER 6' IN WIDTH For optimal tree health, the minimum tree well (planting area) should be 16 square feet (i.e. 4'x4', 2'x8', etc.)																
Acer pseudoplatanus	sycamore maple	Deciduous	35' to 40'	60'	50'		Moderate	Central Richmond, Hilltop	Susceptible to aphids root rots, leaf spot, Verticillium wilt, and boring insects when drought stressed.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain single trunk structure.	Moderate	Dark green, fine-textured foliage. No significant flower display.	Moderate	Oval to rounded form.	Purple-leaf form also sold.
Angophora costata	rose gum	Evergreen	45' to 50'	60'	50'		Low		Reported resistant to oak root fungus.	Neutral to high alkalinity. Tolerant of range of soil textures.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Showy, white flowers in summer. Multi-colored bark.	Moderate	Conical or Rounded	Nursery availability is limited.
* Arbutus 'Marina'	Arbutus 'Marina'	Evergreen	30' to 35'	40'	30'		Low	Central Richmond, Marina	Susceptible to scales and thrip, anthracnose, Phytophthora, root rot and rust.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Low	Showy pink flowers throughout the year. Red bark.	Moderate	Oval to rounded, or umbrella form.	
Cedrus atlantica 'Glauca'	blue Atlas cedar	Evergreen	40' to 45'	50'	40'		Low		Susceptible to Phytophthora and root rot.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Limited pruning required to maintain a single trunk structure.	Moderate	Blue-green to blue-silver foliage.	Slow to Moderate	Conical form.	
Cedrus deodara	Deodar cedar	Evergreen					Low		Susceptible to Phytophthora and root rot.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Limited pruning required to maintain a single trunk structure.	Moderate	Blue-green foliage.	Moderate to Fast	Conical form. Weeping habit.	
Celtis australis	European hackberry	Deciduous	35' to 40'	60'	40'		Low	Central Richmond, Richmond Annex, El Sobrante, Hilltop	Resistant to oak root fungus. Few other pest or disease problems.	Slightly acid to high alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain single trunk structure.	Moderate	Yellow fall foliage color. No significant flower display.	Moderate to Fast	Oval to rounded, or umbrella form.	

*Trees marked with an asterisk are current Richmond street trees.

	Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas		Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
	<i>Corymbia ficifolia</i> (<i>Eucalyptus ficifolia</i>)	red-flowering gum	Evergreen	25' to 30'	40'	30'		Low	Central Richmond, El Sobrante		Susceptible to thrips, boring beetles, Phytophthora, and root rot.	Slightly acid to highly alkaline pH tolerance. Best in loam or sandy soils.	Training and periodic maintenance required to maintain appropriate structure.	Moderate to High	Showy pink, red, or orange flowers at various times of the year.	Moderate	Rounded, spreading form.	Large seed capsules can be a maintenance issue.
*	<i>Ginkgo biloba</i> 'Autumn Gold'	Ginkgo 'Autumn Gold'	Deciduous	35' to 40'	45'	35'		Moderate	Central Richmond		Susceptible to anthracnose.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	High	Brilliant yellow fall color.	Slow to Moderate	Upright oval to rounded form with age..	Select good quality nursery stock with the graft intact. Suckering from below graft can be female tree with messy and odorous fruit.
	<i>Pinus canariensis</i>	Canary Island pine	Evergreen	30' to 35'	65'	30'		Low	Central Richmond, Richmond Annex, Marina, Hilltop		Susceptible to aphids, boring beetles, spider mites, Phytophthora, and root rot.	Wide texture and pH tolerance.	Limited pruning required to maintain a single trunk structure.	Moderate	Dark green, fine-textured foliage. No significant flower display.	Fast	Conical form, wide spreading with maturity.	
*	<i>Quercus agrifolia</i>	coast live oak	Evergreen	40' to 45'	60'	60'		Very Low	Central Richmond, El Sobrante, Hilltop, Pt. Richmond		Susceptible to goldspotted oak borer, aphids, boring beetles, caterpillars, codling moths, scales and white fly, sudden oak death, crown rot, mistletoe, oak root fungus, Phytophthora, and powdery mildew.	Acidic to moderately alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Flowers inconspicuous.	Moderate	Rounded to umbrella form.	Significant foliage and acorn debris.
	<i>Quercus coccinea</i>	scarlet oak	Deciduous	40' to 45'	60'	50'		Moderate			Susceptible to caterpillar, scale, and mistletoe.	Acidic to moderately alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Limited pruning required to maintain a single trunk structure.	Moderate	Brilliant red to orange fall color with sufficient chill.	Moderate	Oval to rounded, or umbrella form.	Holds onto senescent, brown foliage during winter months.
	<i>Quercus ilex</i>	holly oak	Evergreen	35' to 40'	50'	45'		Low	Central Richmond		Susceptible to scales and thrip, anthracnose, Phytophthora, and root rot.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Flowers inconspicuous.	Moderate	Rounded to umbrella form.	Significant foliage and acorn debris.

*Trees marked with an asterisk are current Richmond street trees.

	Botanical Name	Common Name	Type	Spacing	Height	Spread	Ok Under Wires	Water Use Rating	Recommended for Richmond Areas		Disease and Pest Issues	Soil Preferences	Structure Characteristics	Root Damage Potential	Flowers/Fruit/Fall Color	Growth Rate	Habit/Form	Comments
	Quercus rubra	eastern red oak	Deciduous	40' to 45'	60'	50'		Moderate			Susceptible to caterpillar, scale, and mistletoe.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Limited pruning required to maintain a single trunk structure.	Moderate	Bronze red to orange fall color with sufficient chill.	Moderate	Oval to rounded, or umbrella form.	
*	Quercus shumardii	Shumard oak	Deciduous	40' to 45'	50'	40'		Moderate			Susceptible to caterpillar, scale, and mistletoe.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Limited pruning required to maintain a single trunk structure.	Moderate	Brilliant red to orange fall color with sufficient chill.	Moderate	Oval to rounded, or umbrella form.	
*	Tilia cordata 'Greenspire'	Greenspire little-leaf linden	Deciduous	35' to 40'	50'	40'		Moderate	Central Richmond, El Sobrante		Susceptible to aphids, scale, root rots, and Verticillium wilt.	Acidic to slightly alkaline pH tolerance. Adaptive to many soil types as long as the soil to well-drained.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Showy yellow to white flowers in summer.	Moderate	Oval to rounded form.	
	Ulmus hybrid 'Accolade'	Accolade elm	Deciduous	45' to 50'	60'	40'		Low			Good resistance to Dutch elm disease, elm yellows and elm leaf beetle.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Yellow fall color.	Moderate to Fast	Upright to vase shaped form.	
	Zelkova serrata 'Village Green'	sawleaf zelkova 'Village Green'	Deciduous	35' to 40'	50'	45'		Moderate			Susceptible to canker.	Wide texture and pH tolerance.	Training and periodic maintenance required to maintain appropriate structure.	Moderate	Red to bronze fall color.	Moderate	Vase shaped crown.	

*Trees marked with an asterisk are current Richmond street trees.



APPENDIX B

TREE PLANTING BEST PRACTICES

The appendix contains recommended best practices and standards for tree quality and planting along with excerpts from existing City of Richmond documents and ordinances that relate to trees and tree planting. *Section 5: Parks and Public Landscaping Standards* needs to be updated to align with other documents that have been updated since Section 5 was written. This may happen during the creation of an Urban Forest Management Plan.

APPENDIX B

TREE PLANTING BEST PRACTICES AND EXISTING CITY DOCUMENTS

TABLE OF CONTENTS

Table of Contents.....	138
RECOMMENDED BEST PRACTICES	
Tree Quality Specifications and Planting Guidelines.....	140
EXISTING CITY DOCUMENTS/ORDINANCES RELATED TO TREES AND TREE PLANTING	
Section 5 - PARKS AND PUBLIC LANDSCAPING STANDARDS	143
Chapter 10.08 - TRIMMING, PRUNING, CARE, PLANTING, REMOVAL AND MOVING OF TREES, SHRUBS OR PLANTS.....	160
Chapter 12.29 - STREET OPENING AND PAVEMENT RESTORATION REGULATIONS	164
Chapter 12.36 - MAINTENANCE AND CONSTRUCTION OF SIDEWALKS, DRIVEWAYS, CURBS AND GUTTERS	178
Chapter 12.44 - EXCAVATION, GRADING AND EARTHWORK CONSTRUCTION*	184
Chapter 15.02 - GENERAL PLAN	213
Chapter 15.04 - ZONING PLAN.....	214

THIS PAGE INTENTIONALLY LEFT BLANK

TREE QUALITY SPECIFICATIONS AND PLANTING GUIDELINES

Tree Quality Specifications:

Container size, structural form, and size specifications should be determined upon final selection of tree species.

1. General Quality

- 1.1. All trees shall be healthy and free of all pests and diseases. Trees shall be in a vigorous condition, with average shoot growth for the previous season a minimum 12 inches.
- 1.2. Trees shall have a structure typical of the species or variety, and be properly pruned.
- 1.3. Trees shall have sufficient trunk taper and strength to be able to remain upright without staking support.
- 1.4. Roots shall be healthy and extend to the bottoms and sides of the container. Rooting shall be extensive enough to hold the root ball together during planting, but not so dense as to discourage root establishment into surrounding soils. Roots shall not show any signs of restriction due to kinked, circular, or distorted growth.
- 1.5. Primary structural roots shall be near the soil surface.
- 1.6. Trees shall be delivered and maintained with the root balls moist and no indication of water stress.

2. Government Compliance

- 2.1. All trees shall comply with applicable State and Federal laws regarding inspections for pests and diseases. Any required clearances shall be obtained prior to planting. Of special note: all trees to be show as free of the serious plant pathogen *Phytophthora ramorum* (cause of Sudden Oak Death) to prevent the spread of the pathogen and damage to existing trees. Testing per most current industry standards as described in the California Native Plant Society's Best Management Practices (BMPS) For Producing Clean Nursery Stock.
<http://phytosphere.com/BMPsnursery/index.htm>

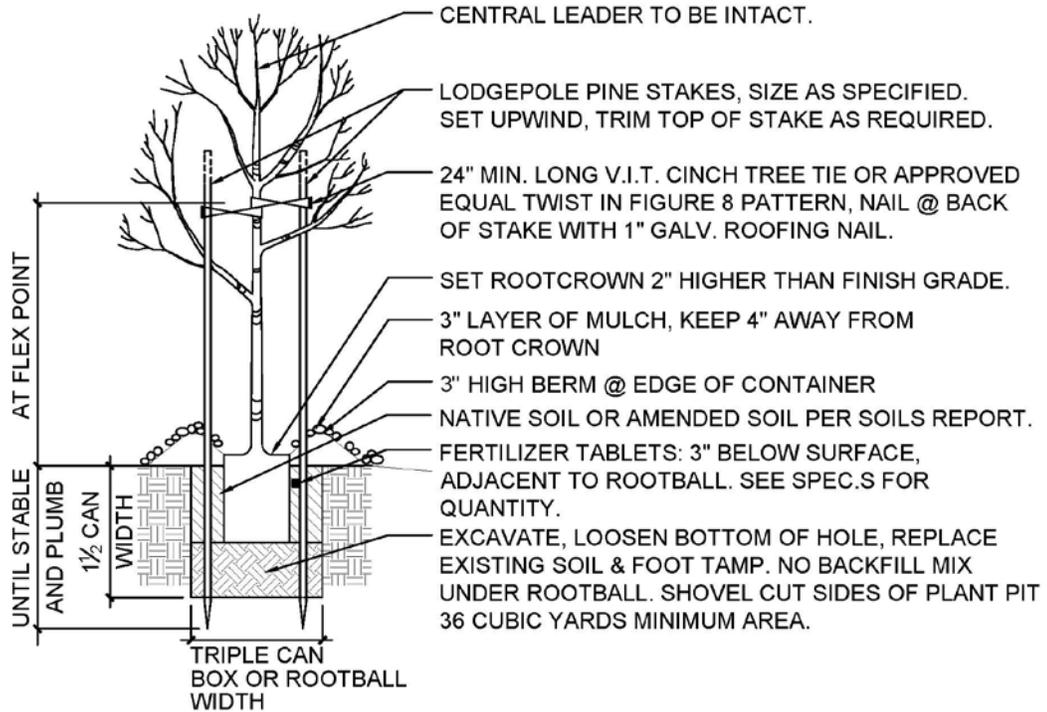
3. Structural Specifications

- 3.1. All trees shall be trained with a central leader established, unless a multiple trunk type structure. Primary lateral scaffold branches shall be no closer than six (6) vertical inches apart and radially distributed around the trunk. All primary lateral scaffold branches shall be established 6.5 feet above soil grade.
- 3.2. Lateral scaffold branches shall have diameters (measured 1 inch from trunk attachment) no greater than 2/3 the diameter of the trunk at the point of attachment.
- 3.3. All scaffold branches shall be free of included bark and excessively narrow angles of attachment.

Planting Specifications:

1. The tree planting shall be in conformance with planting detail (Figure 1).
2. If poor soil drainage is suspected, use a percolation test to verify drainage. Sub-surface drainage may be required, or selection of a species tolerant of poor drainage conditions.
3. Planting pit shall be twice the diameter of the container size at a minimum.
4. Generally, the back fill soil shall be the existing native soil.
 - 4.1. The backfill soil shall be thoroughly fragmented to a friable condition and free of hard clods greater than 2 inches in diameter. No organic material shall be incorporated into the backfill soil. Backfill soil shall be free of subsoil, clay, lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.
 - 4.2. Amendments incorporated in the planting backfill should only be considered in areas with known poor quality. Amendments should be selected for the specific soil problem. Soil amendment requirements shall be determined through an agricultural suitability test performed by an accredited soils testing laboratory.
 - 4.3. Use light tamping and watering to settle the backfill soil and remove air pockets. Do not over compact and do not place soil on top of the root ball.
 - 4.4. Create a three-inch high earthen basin around the tree to facilitate hand watering. The basin will need to be filled multiple times to ensure enough water to wet the entire root ball.
5. Fertilizers:
 - 5.1. Place plant tablets (21 gram planting tablets 20% Nitrogen, 10% Phosphoric Acid and 5% Potash (20-10-5) available from Agriform) 3 inches below surface of rootball and 1/2-inch from roots at the following rates: 2 tablets for a 15-gallon tree, 6 tablets for 24" box tree, 8 tablets for 36" box tree, and 10 tablets for a 48" box tree.
 - 5.2. Specific recommendations based upon a soil analysis and report would take precedence over the tablet application.
6. Refer to Figure 1 for proper staking procedures.

Figure 1- Planting detail.



TREE PLANTING AND STAKING

NOT TO SCALE

CITY OF RICHMOND STANDARD

SECTION 5 – PARKS AND PUBLIC LANDSCAPE STANDARDS

Parks and public landscapes are managed landscapes which demand particular community appeal providing sense of place and healthy living. Standards are required therefore to ensure continued community appeal and municipal investment in these managed landscapes at the highest possible level commonly accepted throughout California but also peculiar to the needs of Richmond Bay Area environments.

Clarification as to the applicability of these standards to a particular project can be obtained from the Superintendent. Failure to conform to these standards as well as other applicable specifications will result in the Superintendent directing corrections of deficiencies any time during design, plan review, landscape installation or the maintenance periods. Other applicable specifications include by reference, but are not limited to the following planning documents, codes, guidelines and standards:

- “City of Richmond General Plan; Parks & Recreation Element” and related elements.
- “City of Richmond Five-year Strategic Business Plan,”
- “Standard Specifications” of the State of California
- “City of Richmond Urban Forest Management/Master Plan Reforestation Supplement; December 1997,” with cover letter by the Superintendent
- “Richmond Parks Master Plan: 2010”
- City of Richmond Municipal Code; Chapter 10.08 and related chapters
- “Special Provisions” sections of any recent “City of Richmond Landscape Management Services” contract specifications.
- “City of Richmond Integrated Pest Management Policy.”
- “California Landscape Standards” by the California Landscape Contractors Association
- “The El Sobrante Valley Parks Study; 2001”
- “Marina Bay Neighborhood Landscape Management Plan; 2009”
- “Baxter Creek Maintenance and Management Guide; 2010”
- “Water Use Classifications of Landscape Species; 1999” (“WUCOLS III”) by the University of California Cooperative Extension and the California Department of Water Resources

5.1 Public Landscape Design Standards

5.1.1 General – The design of parks and all other public landscaping shall conform to Section 7-902 of the California Department of Transportation Highway Design Manual, as well as applicable portions of the above documents.

5.1.2. Specialists – Any departmental, agency or developer/owner project sponsor shall retain the services of a landscape architect, soils engineer and pest control advisor, all of whom are currently licensed in the State of California. Other specialist, like a certified consulting arborist, architect or civil engineer may also be required to provide full attention to site conditions. The services of these specialists shall be coordinated to produce the best project specifications language and design drawings acceptable to the City. The

project sponsor shall be responsible to include the comments and certifications of the soils and /or a civil engineer in the landscape design where there is any site specific concern about irrigation and slope stability or drainage.

5.1.3 Soils Analysis Report – A lab test shall be made of the topsoil on site to determine suitability for landscaping. The selection of plant material, fertilizer, soil amendments, soil conditioners, and irrigation systems, shall address, in particular, the needs as indicated in the soils analysis report. A copy of the soils analysis report shall be given to the Superintendent prior to design submittal. Soil PH, composition, organic content, and chemical analysis shall be indicated in the report. Known or suspected infestations on site shall also be investigated in part by means of preparing the soils analysis report along with recommendations made by the pest control advisor. Another soils analysis report shall be submitted to the Superintendent 90 days before the one year landscape establishment maintenance period is scheduled to end.

5.1.4. Landscape Site – The design shall exhibit familiarity with the site in the following areas of concern:

1. Topography and drainage.
2. Available water sources(s), quality and pressure(s).
3. Existing trees and other features desirable for preservation.
4. The location of existing and planned hardscape features and utilities.
5. Available power and telephone point of connection sources for irrigation controllers.
6. The method of containment or neutralization of existing infestations including weeds.
7. Suitability of plant, irrigation and fence type selection for local environmental concerns as follows:
 - a) Vandalism
 - b) Predictable foot and vehicle traffic patterns
 - c) Prevailing winds
 - d) Exposure to the sun
 - e) Frost and cold
 - f) Fire hazards
 - g) Rates of predictable aging and replacement ('life cycle' projections) of materials (including plants)
 - h) Relation of the mature landscape to all the above.
 - i) Compatibility of selected plant material with existing protected specimens, e.g., drought tolerant versus high water usage plants.
8. History of the site and related cultural concerns raised by the City referenced planning documents or any specific area plan.
9. Relation to adjoining landscapes as follows:
 - a) Street tree selection and location
 - b) Type and quality of fencing
 - c) Successful plant material in the area
 - d) Planting themes established in the area
 - e) Continuation of public pathways for pedestrian and bicycle through traffic
 - f) Preservation of views
 - g) Protection of privacy

- h) Protection of environmentally sensitive areas
- i) Consideration for crime prevention (per CPTED standards where applicable)
- j) Connectivity of area drainage systems

5. 1. 5 Water Conservation – The City of Richmond is actively engaged in a water management plan. Pursuant to that plan water conservation for any site landscape shall be designed from the following requirements:

1. Plant selection for the majority of the area to be irrigated shall be made from specimens that are documented as being drought resistant or otherwise water conserving in nature. Plants shall be grouped together in hydrozones (by irrigation stations) according to water conserving and use habits (per WUCOLS III plant listings). Specimens which only obtain drought tolerance with maturity cannot be mixed with those which naturally adapt to arid situations or those natives which turn truly drought resistant at a young age. Groupings shall take into account habits of water retention, early dormancy, early stomatal closure, decreased transpiring surfaces, photosynthetic adaption, or other methods of drought avoidance.
2. High water using specimens shall be confined to specific areas of high visibility constituting no more than 5 % of the total area to be irrigated on a square foot basis. The drip line of water demanding street trees, annual flower bed areas, and raised container plantings shall be counted as part of the high water using areas.
3. Lawn areas shall constitute no more than 25% of the total area to be irrigated. Only those areas that are clearly intended for sports or other recreational activity recognized as demanding natural turf may be exempt. All lawn and turf areas shall have perimeters with the least lineal footage possible. No woody plantings or other objects other than turf may be included within the perimeters of a lawn area. At no time may lawns occupy medians, gores, verges, park strips, islands or any long, narrow or odd shaped area. Turf shall not be planned for any slope greater than 6 to 1. Isolated mounds or undulations shall be avoided within a lawn. All objects that may disrupt even precipitation over the turf shall be excluded from the lawn areas. Grass selection shall be made from deep rooted tall or improved type fescues or from several warm season grasses where winter dormancy can be tolerated. Blue grasses and other high water using cool season selections shall be limited to no more than 10% of any grass mix.
4. Ground cover areas which require overhead (non-bubbler) irrigation shall be limited to no more than 35% of the total area. Such ground cover areas, lawn areas (#3 above), and high waters use areas (#2 above) together cannot exceed 50% of the total square footage to be irrigated with overhead applications.
5. A water consumption analysis shall be made for all plant material to be irrigated (overhead, bubbler and drip). Such an analysis shall account for each of the following:
 - a) Projected mean maturity for each hydrozone plant grouping (including lawn areas).
 - b) Gross water demand of each plant grouping at maturity (including lawn areas) under optimum conditions. The demand shall be clearly stated in U.S. gallons per minute, hour or day. The basic explanation for optimum conditions shall be presented in terms of canopy/leaf type size, native precipitation and soil field capacity or documented studies of specific specimens selected.
 - c) The gross water demand adjusted for the local (Richmond) evapotranspiration (ETo) rate for 12 months.
 - d) The ETo demand adjusted again for soil field capacity, as the site soil analysis may indicate.

- e) Square footage of each hydrozone plant grouping (including lawn areas) factored to account for slope conditions.
 - f) The analysis compiled as a brief and included with the design submission.
6. The irrigation system shall be designed around the water consumption analysis. Stations of the irrigation controller shall coincide with plant habit grouping by hydrozones.
 7. At no time can lawn irrigation be combined with irrigation for other plant groupings. The specific water demand (adjusted by the ETo rate) of a plant habit grouping shall be supplied by the station system not exceeding the U.S. gallons per minute, hour or day indicated in the analysis. Where individual specimens within a grouping have a demand much greater than others of the same group habit (as naturalized trees may have amongst native shrubs) extra emitter outlets shall be placed as needed or a separate station for drip emitter or bubbler head system shall be supplied. All overhead spray systems shall be situated so as not to wet sidewalks, streets and other improvements as well as other non-irrigated areas. Above ground spray rotor and impact heads shall not be specified where pop-up type heads can be used. All areas to receive overhead applications shall have 100% overlap (head to head) coverage. Overhead spray systems shall be kept to a minimum at roadside and in slope areas. The majority method of irrigation for any landscaped site (except sports fields) shall be stream rotors, drip emitters and/or bubbler type heads. All irrigation for the city including drip emitter systems shall be designed and installed as permanent automated systems with subterranean lateral lines.

5.2. Landscape Materials

5.2.1. General– All materials provided by the contractor shall be new or viable. Repurposed, transplanted or recycled materials are also encouraged for inclusion in city parks or any other public landscape projects but must be preapproved by the Superintendent. Materials shall be free of any contamination, infestation or damage. Materials not specifically addressed in these specifications or associated notes and drawings but are understood as a matter of industry standards necessary to complete an institutional quality landscape project shall nevertheless be provided by the contractor (such as a wide array of irrigation fittings and components). Substitutions of any materials or determination as to any 'equals' must be approved by the Superintendent. Any materials deemed unacceptable by the Superintendent, his representative or the landscape architect must not be shipped to the landscape site or be removed from said site the same day (without any 'restocking' cost incurred to the city) . All materials which conform to these standards shall be installed with all necessary components.

5.2.2. Materials Furnished or Managed through the City – The following materials, unless otherwise noted by the City may be furnished by East Bay MUD or managed through the City and paid for by the project sponsor or their contractor:

1. Water meter, the water meter box and adjustable spuds.
2. Backflow prevention device – A Febco double check device and assembly
3. Mulch supplied by the City urban forest tree trimming program (at no cost to project)
4. Off-site deposit locations for salvaged materials and topsoil affording the project short haul routes
5. On site or adjacent locations for the contractor's construction yard, set-down/receiving yard, nursery, topsoil stockpile, soils borrow or Kline-tank watering with hydrant meter.

5.2.3. Soil Improvements

1. Imported topsoil – Should topsoil have to be imported to the landscape site it shall be predominantly a friable loam in nature, obtained from well drained arable land. It shall be free of roots, rocks, debris, and other heavy materials. It shall have a PH between 7.0 and 6.0 and meet only the following allowable analysis or composition:
 - a) Sodium (SAR), 0-4 maximum
 - b) Salinity (ECeX10³), 0-2.5 maximum
 - c) Boron (in PPM saturated extraction), 0-2
 - d) Decompose organic material, 5-50%
 - e) Gravel no greater than 3/4", 0-10%
 - f) Course sand, 5-20%
 - g) Fine sand, 20-50%
 - h) Silt, 25-50%
 - i) Clay, 5-30%
2. Soil amendments for general application – should amendment have to be incorporated into native soil it shall be a decomposed or readily decomposed nitrogen stabilized organic material such as Forest Humus Duraloam, or a nitrolized redwood sawdust. It shall be a fresh aerated material containing particles not greater than 1/4" in size. No more than 25% of particles can fail to pass a 500 micron sieve. Amendment which has been allowed to "sour" at the bottom of stockpiles cannot be used. It shall contain the following allowable analysis:
 - a) Soluble salts (in PPM saturated extraction), 3.0 maximum
 - b) Iron, acid-soluble dilution (based on dry weight) 0.08 minimum
 - c) Ash (based on dry weight) 0-6.0 minimum
 - d) Nitrogen (based on dry weight) 0.4-0.6 minimum
3. Fertilizers – All fertilizers must contain the manufacturer's warranted analysis on each container which will clearly state the compositions of N (Nitrogen), P (Phosphorus) and K (Potassium) as well as any secondary or micro nutrients. Each type of fertilizer applied as a general soil improvement must be able to respond in season to the particular soil composition, PH, solubility and species demand of an area to ensure optimum usage. The fertilizer, like the soil amendment, should be the one that best addresses the shortages revealed in a soil analysis as compared to the needs of any plants introduced area by area. Changes of or additions made in fertilizers must also anticipate other improvements made in the soil. Fertilizers applied during the establishment maintenance period should obtain approximately 1 pound N minimum per 1000 square feet bimonthly for most selections of plant material. The final application of fertilizer at the end of the establishment maintenance period must address deficiencies shown in the final soils analysis taken near the end of that same period. N derived from an ammonium must be very limited to non-existence in any fertilizer mix.
4. Fertilizers to be used for planting pits are as follows:
 - a) Agriform Bluechip Tablets: 21 grams 10.10.5 plus calcium, sulfur and iron (or approved equal).
 - b) A granulated balance of 3:1:1 but contains the lowest available adjusted salt index
 - c) Bone meal; 4.12.0 (especially for bulb and tuber plantings)
 - d) Or as identified specifically for planting pits in the soils fertility lab test report

5. Fertilizer for warm season application for lawn establishment; 27.4.6 with six secondary or micro nutrients (one of which is 3% Fe) and a minimum of 5% sulfur coated N for slow release.
6. Mulches and top dressing – unless otherwise specified for specialized situations (such as play lots), all mulches and top dressing shall be small grade “walk on” type bark with an aggregate particle size of approximately ¼ inch or mulch as supplied by the city urban forest tree trimming program. It shall be well aerated and free of debris (both organic and man made). Mulch which has been allowed to “sour” at the bottom of stockpiles cannot be used.
7. Gypsum and other soil modifiers can be used as the soils analysis indicates.
8. Soil amendments for planting pits shall be matched to the mix used by the nursery in the container of the particular specimen (s) to be planted. No other amendment for planting pits may be specified or employed. The nursery from which container stock is purchased shall provide a written description of the planting mix it uses in sufficient time to obtain such a mix for amending planting pit backfill.
9. For non-irrigated plantings synthetic based water absorbent polymer gels shall be added to the backfill at the manufacturer’s recommended rates.

5.2.4 Irrigation Equipment –

1. Pipe and fittings – All mainline and lateral pipe and fittings shall be schedule 40 NSP PVC solvent welded. The pipe shall meet ASTM-D-1784 standards. For systems with pipe diameters over 2” Class 200 bell jointed PVC pipe may be utilized. The fittings shall meet ASTM-D-2466 and NSP 14 standards. All pipes shall be marked continuously and permanently with the manufacturer’s identification of type and quality control.
2. Pipe Joining Materials – PVC solvent cement shall be IPS Weld-on # P-68 (or approved equal). It shall conform to ASTM-F-656 standards and rated for all classes and schedules of PVC up to 12 inch pipe. No fast setting solvent cement may be used. Primer shall be IPS Weld-on # P-68 (or approved equal). Only Teflon tape may be used to join threaded fittings. No pipe dope may be used. Sleeves and conduits for paving crossings shall also be Schedule 40 NSP PVC pipe and protected temporarily with non-solvent cemented end caps until fitted with pipe and wire.

3. Valves and Valve Boxes

- a.) Remote control valves shall be the Griswold Controls 2000 series or DW-PRV series (or approved equal). A ball valve such as the 'TU' series by Chemtrol or 'BLT' series by Rainbird shall be placed directly ahead of remote control valves.
- b.) Quick coupler valves shall be the two part all brass type with self closing and locking rubber cover such as 'LVC' series by Rainbird (colored appropriate to the water source). Each site shall be provided with 2 all brass quills mounted by all brass swivel hose bib as well as 2 quick coupler cover keys. Swing riser assembly and staking shall be provided.
- c.) Flush valves for drip system laterals and assemblies shall be provided. The flush valves can be the KBI model 'MIP-750-S' or ball valves as noted in 'a' above.
Check valves (or anti-drain valves) can be the Valcon 'ADV-5000' series or the KBI 'CV' series located in-riser (or approved alternative).
- d.) Valve boxes for all remote control valve assemblies and flush valves assemblies servicing lateral runs longer than 60 feet shall be the Brooks model #1419 with bolt down lid (or approved equal). Valve boxes for isolation valves which stand alone and flush valve assemblies servicing lateral runs 60 feet or shorter shall be the Brooks model #70 with bolt-down lid (or approved equal). Only one valve assembly per box will be allowed. The top of the lid shall be marked as called for in the notes, specifications and drawings. Locate all boxes as noted in the specifications and drawings but not within lawns.
- e.) Isolation valves shall be the non-rising stem all brass gate valves such as the 'T' model by Nibco (or approved equal).
- f.) Pea type gravel free of other aggregates, fines, debris, soils and organic materials shall be placed at the base of the valve box pits to the depths indicated in the specifications and drawings.

4. Head Assemblies

- a) All heads shall be installed on a swing joint assembly as indicated in the specifications and drawings. Fittings shall meet ASTM-D-2464 standards.
- b) Any above ground shrub heads shall be staked or installed on a swing assembly and painted as required. No above ground head shall be employed in lawn areas. No above ground head shall be employed in areas of predictable pedestrian traffic. No above ground head shall be used where a 'high-pop' type head can be employed. Generally, above ground heads will seldom find use in new City of Richmond landscapes.
- c) Heads shall be those specified in the approved drawings (or approved substitutions).
- d) All heads shall be set perpendicular to finished grade unless otherwise designated by approved drawings, the Landscape Architect or the Superintendent.
- e) Heads shall be added, adjusted or relocated to assure optimum precipitation (during windy conditions) over the area to be covered. No head shall be situated so that it shoots directly into the opening end of the controller box or other utility boxes.

5. Drip Emitter Assemblies

- a) All drip emitter assemblies shall be installed on Schedule 40 PVC lateral lines.
- b) All drip emitter assemblies shall be installed as shown in the drawings or as required by the Superintendent. No on-the-ground drip lateral assemblies will be permitted.
- c) The single outlet emitter shall be the Bowsmith 'S1OL' 1 gal. (or approved equal) mounted on a length of IPS flex-PVC hose and 90 degrees Marlex street ell.

- d) The multiple, outlet emitter shall be the Bowsmith 2000 series or the Rainbird 'EMG-M-101' (or approved equal) mounted on a Schedule 80 riser and encased by the Rainbird SEB-6 access sleeve (or approved equal). Lengths of polyethylene distribution tube shall be held by AG Products 'S2' stakes (or approved equal) underground.

6. Electrical Services

- a) All wire connections shall be made with copper crimps encased by PT-S5 sealer (or approved equal) and snap Tite caps (or approved equal). Epoxy type sealers or Electrician's tape and wire nuts will not be allowed for field wire connections.
- b) Wire for all 24 volt or 120 volt services shall be #14 gauge solid strand copper for damp and wet locations. It shall be rated at 600 VAC THHN/THWN AWG and meet the National Electric Code and Underwriter's Laboratory standards. Larger gauge wire is required for longer pulls as AMP demands (current or future add-ons) indicate.
- c) Electrician's tape or duct tape can be used to bind bundles of 24 volt wire at 12 foot intervals for direct burial. Direct burial shall be made in irrigation pipe trenches as shown in drawings.
- d) Insulation jacket colors shall be white for common wire, black or red for station/signal wires and blue for extra/spare wires. Four spare wires (minimum) shall be provided for each controller and pulled into the farthest limits of the wire distribution. More than one common wire may be needed as site conditions require.
- e) All 120 volt power wire shall be housed in heavy-walled utility class PVC conduit with factory made bends, couplings and fitting where permitted by the NEC. Burial for all 120 volt power service shall be made at a minimum depth of 18". Where power conduit is routed into a building for an internal wall mounted controller it shall comply with building regulations.
- f) The ground rod shall be copper coated and 8 feet by 3/4 inches diameter. It shall be attached to the junction box locally at the controller by means of a solid copper ground jumper and approved clamp.
- g) The junction box shall contain a 120 volt SPST off/on switch, standard plug receptacle and ground screw. It shall be attached to the inside of the controller pedestal or security enclosure chassis.
- h) Pull boxes shall be the Brooks 1100 series (or approved equal) with bolt-down lids.

6. Controllers – Controllers shall be satellites of only one of three preapproved master systems for three specific regions of the city (Rain Master Evolution for the south, Marina Bay, Pt. Richmond and harbor areas; CalSense Master for the central areas; or Griswold IDC for the north Hilltop and Richmond Parkway areas). Each controller satellite shall contain each of the following as a minimum:

- a) All solid state circuitry with accuracy to the second
- b) Full two way communication capability to master unit via telephone, radio or wire
- c) Protected non-dedicated keyboards that are readable in bright daylight or night
- d) Automated applicability of weather station (including CIMIS) precipitation data
- e) Optional 'sensor' input outlets for other timed applications (like lights, gates, etc.)
- f) Multiple (multi-language option) displays showing active stations and programs
- g) Review feature for display (including sensor data)
- h) Weatherproof and watertight outdoor locking case
- i) Lithium long life backup battery and automatic Daylight Savings Time changes
- j) Automatic default program which can be disabled
- k) Resettable circuit breaker (3.0A break) that exempts defective stations

- l) Master valve/pump start circuit which can be controlled in manual mode
- m) Programs with independent start times but capable of cluster applications
- n) Syringe cycle program option by station or cluster
- o) Percentage budgeting increase/decrease for all programs in one percent steps
- p) Skip day feature for each program
- q) Programmable rain mode to automatic mode recovery feature
- r) All stations run in sequence
- s) Rain mode switch with rain sensor activating attachment
- t) Manual program will run any program or selected station clusters
- u) Automatic program overlap protection which can be disabled
- v) Built-in access code options (including 'sensor' options)
- w) Remote control capability
- x) Built-in self-test feature that logs information for operator review
- y) UL approved
- z) Powered by dedicated 120v service with dedicated grounding and power backup

5.2.5 Planting Materials

1. Hydroseed – Refer to the Superintendent’s Wildflower specifications by areas of the city.
2. Seeded lawn – seed shall be at least 98 percent pure and completely free of noxious weed seed. Only re-cleaned Grade A “new crop” seed delivered in unopened containers bearing the dealer’s label showing guaranteed analysis shall be used. The seed shall be pre-treated with a fungus preventative. Any seed allowed to become wet or moldy or otherwise damaged will not be accepted.
3. Sodded Lawn – Sod shall be at least 9 months old and no more than 16 months old and field grown by a commercial nursery. Sod shall be healthy and well knitted containing no more than ½” of thatch and free from debris, unspecified grasses, pests, noxious weeds, insect eggs, or infestations of any type. Sod shall be delivered in moist rolls within 24 hours of harvesting. Sod will be cut with a thickness of 5/8” to 3/4” and dimensions of 18” x 72”.
4. Rooted Cuttings – Only healthy rooted cuttings or flat grown material may be used. Material shall be grown by a commercial nursery and be delivered moist to the job site within 24 hours. Material that is too wet or too dry or showing signs of fungus or other infestation shall not be acceptable. All material shall exhibit good root growth. Roots shall constitute at least 20 percent of individual plant material for all specimens.
5. Container Grown Specimen – Only the No. 1 grade of nursery stock as provided in the State of California Grading Code may be planted. Plants shall conform to the American Association of Nurserymen Standards, AAN-SI Z60.1 as well as any height, spread, symmetry, or caliper as indicated in drawings or specifications. Plants shall be delivered unpruned in the original nursery containers bearing tags which show genera, species, cultivars, and/or varieties. All shipments of container grown species shall show documented compliance with Federal, California, and regional laws having to do with diseases and infestations. Plants which do not comply with the above or are shown to be broken, root bound, too young for the container, sun burned, wind burned, too dry, infested, trunk girdled or in any other way damaged will be rejected by the Superintendent. The nursery shall provide a written description of the planting mix used for the container grown specimens to be shipped. Any boxed, balled and burlaped or bare root specimens shall comply with the above as is applicable.

6. Transplanted Specimen – Only healthy unpruned specimens shall be delivered to the job Site within 24 hours of uprooting. Root mass shall be sufficient to anchor and sustain the plant. Roots shall be cut clean. Broken, stripped, or frayed roots will not be acceptable. Any trunk or branch which has been girdled, stripped, broken, or marred during uprooting, transport, or planting will not be acceptable. Tags for shipments from out of state or quarantined zones will show evidence of inspection.
7. Tree Stakes – Only treated 2" x 8' straight, close grained, lodge pole pine shall be used. Stakes will have been given a point at one end prior to treatment with copper naphthante. Treatment shall penetrate the stake surface to a minimum depth of ¼". The blunt end of the stake will be cut to the appropriate height for individual trees on-site.
8. Tree Ties – rubber tire strips (or approved alternative) shall be used.
9. Tree Tie Nails – Only galvanized steel nails shall be used.
10. Tree Guys – Aircraft cable inserted through white 1/2" PVD pipe (as markers for pedestrian safety) and sections of ½" garden hose (for protection of tree limbs) and fastened to stakes through holes drilled on-site (or approved alternatives) and wire rope type clasps. Deadman anchors, if utilized as an alternative shall be of approved durable materials (not wood).

5.2.6 Hardscape Features

1. Headerboard – Only 2 x 4 construction grade recycled plastic lumber or benderboard shall be used. Headerboard splices can only be 1 x 4 recycled plastic lumber (2 feet in length) matched to the rest of headerboard.
2. Headerboard Stakes – Only 1 x 2 clear Fir (or equal) shall be used, one foot in length sharpened at one end and bevel cut at the other end.
3. Headerboards Nails – Only galvanized steel nails shall be used.
4. River Cobble – Only 4" to 6" aggregate Lodi or Linn Creek type cobble shall be used where better than 66% are unbroken, better than 66% are near 5" size, and 66% are smooth spherical or egg like in shape.
5. Mortar for River Cobble – As per Section 51-1.135 of the Standards Specifications.
6. Decomposed Granite – Only decomposed granite in an aggregated grade between 3/4" and fines can be used as specified. They shall be free of other aggregates, debris, and organic materials. An approved binder shall be pre-mixed into every delivery of decomposed granite ("DG") to the project site. No DG shall be installed without documented evidence of an approved binder incorporated at place of origin. Preferred binder will be resin based as typically specified for trails by EBRPD.
7. Imprinted Concrete – Only the Bomanite process (or approved equal) shall be used. The Concrete shall have a minimum compressive strength of 3000 psi. Portland cement shall conform to ASTM C 150, Type I, II, or V, depending on soil conditions. Aggregates shall conform to ASTM C33. Only potable water may be used. At no time can calcium chloride be introduced into the concrete mix. Only Bomanite Heavy Duty Hardener and Bomanite Color Curing Compound (or approved equals) may be used.

5.2.7 Pesticides – Only those pesticide products (including growth regulators) that are recommended, in writing by the Pest Control Advisor shall be used consistent with the City IPM policy.

5.3 Landscape Construction Standards

5.3.1 General – All work performed as site preparation, hardscape, installation of irrigation systems and planting shall comply with Standard Specifications Section 20, “Erosion Control and Highway Planting” as well as hereunder. All work will be performed generally in reference to the Standard Specifications of the State of California and as an industry standard to the California Landscape Standards of the California Landscape Contractors Association (“CLA”). Where there may be conflict between such standards and project specifications, notes or drawings these City of Richmond Parks and Public Landscaping Standards and/or the determination of the Superintendent shall prevail. The contractor performing such work shall be currently licensed with the State of California (C-27 minimum) and hold or obtain all other licenses, certificates, permits or waivers during the course of said work necessary to performance at industry standards. Clean up and site protection shall be a part of any installation work and performed each day on site to the satisfaction of the Superintendent.

5.3.2 Site Preparation

1. Site conditions – The landscape site shall be free of all debris, stocks piles, toxic spills, equipment, structures, and other unnecessary appurtenances left by other trades and former property users. Full ‘grub-and-clear’ will have been conducted to the satisfaction of the Superintendent and all detrimental organic material such as weeds destroyed and removed from the site. Native topsoil cover will have been protected or stocked in localized identifiable unsullied piles. The landscape site shall lie as or be rough graded to within a 10th of a foot of finish grade. It shall have a 6 inch minimum cover of topsoil approved by the Superintendent free of subsoil, excessive rock or spoil. Topsoil shall be one, or a combination of the following:
 - a) Original native cover.
 - b) Redistributed native from stockpiles the contractor has had kept on or near site.
 - c) Imported.
2. Sleeves and conduits – All necessary crossings for irrigation systems shall be in place and protected with end caps prior to paving.
3. Points of connection – a secondary box or meter pedestal for 120 volt service and water meter, box and backflow prevention device for irrigation shall be prepaid and installed as per approved plan. The concrete meter box shall be set to finish grade. At no time can materials capable of deterioration (such as wooden boards) be employed to raise any meter box in order to bring it to finish grade. Durable materials (such as fire hardened bricks) shall be used in sufficient quantities to support any valve or meter box in order to raise it to finish grade. Care shall be taken throughout all phases of installation and maintenance to protect materials provided by PG&E, EBMUD and the City.
4. Grub and clear – All noxious weeds on-site and specially identified invasive/exotic weeds must be destroyed and removed. Other weeds may be removed as needed. Groundcovers that had been provided by hydroseeding for erosion control can only be removed during the rainy season (between October 15 and April 15), upon approval by the City Engineer and Superintendent. To obtain such approval, the contractor must provide proof or assurance of timely revegetation. A combination of pre-emergent and post emergent spray programs as designed by the Pest Control Advisor or manual and mechanical means may be employed by the contractor as needed. All weeds or related debris shall be disposed of in an approved manner.
5. Fuel suppression for fire safety – In the event of any delay between completions of mass grading and the start of landscape installation during the fire season the contractor shall remove fuel

loading vegetation from the site. Such removal may entail mowing hydroseeded areas as well as weed populations. The contractor is to understand hereby that time is of the essence in performing such fuel suppression during the fire season.

6. Fences and property lines – Such lines shall be established and made field identifiable in a timely manor to enable access for project work.
7. On-site hazards – the site will be surveyed and all remaining potential hazards noted in as-built drawings and their risk/life cycle assessment documented to the satisfaction of the City Engineer, Risk Manager and Superintendent.
8. Salvage – existing materials and equipment on site deemed salvageable by the city will be identified with the contractor prior to demolition and arrangements then made for removal. Irrigation components or other material suitable for repurposed use elsewhere may be identified. Special care shall be taken for removal, transport and storage of valuable and/or historic equipment, art, sculptures or monuments. At not time can the contractor presume to remove or destroy objects of obvious value to the city such as dedication or memorial markers.
9. Prework meeting – Such a meeting is mandatory and shall include the Superintendent (or designee), landscape contractor, general contractor and project manager. No further landscape related work may commence save any of the above necessary to site preparation. The prework meeting shall be the time and place to determine that any other work (as in the below) may proceed.

5.3.3 Irrigation System

1. All irrigation systems shall be installed and tested as per approved drawings and specifications as well as in the below. The contractor shall provide an experienced irrigation technician to the project capable of reading and applying such drawings and specifications in ‘the field’ as well as keeping detailed and up to date records to generate reliable as-built drawings.
2. Excavation for irrigation trenches shall be performed to cause the least possible damage to streets, sidewalks utilities and other improvements. No trenching of paved streets will be permitted. Care shall be taken not to interfere with trees. Route the trench a minimum of six feet away from tree planting locations and outside the drip-line of existing tress. In the event tree roots have to be cut such cuts shall be made clean without any ragged stripping, fraying or twisting of the roots. Where roots of a diameter greater than 2 inches are encountered the City Arborist assigned by the Superintendent shall be contacted for direction. Trenches shall be cut consistently with grade and uniform bearing for the full length of the line. Any improvements or plantings disturbed by excavation shall be replaced or reconstituted in an approved manner. Excavated material shall be placed so as not to cause damage to improvements or plantings nor obstruct traffic (vehicular and pedestrian) or surface drainage.
3. PVC pipe shall be cut with a fine tooth hack saw and any burrs shall be removed. The pipe and fittings shall be clean and dry prior to application of solvent cement. All mainline pipe ends and fitting sockets shall be treated with primer prior to application of solvent cement. Both primer and solvent cement shall be applied uniformly over three quarters of both insertion surfaces. Any pipe or fitting where solvent cement had been allowed to thicken prior to joining shall be discarded. Immediately after cement has been applied pipe and fittings shall be joined with a twisting motion to the full depth of the socket and any excess wiped away. At no time can cement be allowed to cover threaded fittings. Joined pipe and fittings shall be allowed to set up prior to any further handling. Time for curing will increase with damp/or cold weather. Only pipe with completely cured welds can be filled with water. Excessive layers of teflon tape and/or any pipe dope will not be allowed on threaded joints. Also, excessive cinching will not be allowed. No PVC pipe shall be

exposed above ground. Mainline shall be placed a minimum depth of 18" and lateral line 12" in the trench.

4. Valves shall be installed in such a way that easy access and service are possible. No valve (except in-line check valves) shall be buried or silted over. No valve shall be placed inside a box in such a way that handles and bleeder cocks are held tight against the box wall. If necessary, a larger valve box shall be set. It shall be possible to lift the bonnet of the remote control valve without dirt and debris sliding inside the valve body. Approved pressure regulator and "Y" strainer shall be included with all remote control valve assemblies servicing drip emitter systems. It shall be possible to remove filters from "Y" strainers without digging. The valve stem of a remote control valve shall not be left in a fully open position. It shall be throttled part way down to avoid the valve becoming "stuck open" but still allowing optimum operation. All valve boxes shall be bolted securely shut. On some projects it will be specified that the box be buried to thwart tampering by vandals. No debris from valve assembly or remnant wiring shall be left inside the valve box. The location of quick coupling valves shall be marked in an approved fashion.
5. Heads shall be installed as specified. All risers shall be flushed prior to assembly of clean head units. Subsequently, flushes of end risers on each lateral line shall be performed during each maintenance period. Dissimilar heads shall not be placed on any station system. Nozzles and screens shall be change out as needed to ensure full irrigation coverage (including during windy conditions).
6. Drip emitter distribution tubing shall be installed subterraneously. Drip emitter systems shall be flushed and filters cleaned monthly throughout each maintenance period.
7. All electrical services shall be installed strictly as specified. No wire splices shall be made in the field outside approved controller box, valve box, and pull box locations. Nicked or cut wire shall be removed and discarded and new installed. Wire shall not be pulled taut at any location. Expansion loops, coils and serpentinous runs shall be liberally turned into every pull of 24 V wire. Wire splice ends shall not be exposed to wet or damp conditions. In the event of delay between pulling and connecting wires the splice ends shall be covered securely with electricians tape and pulled up out of the bottom of the boxes or water catching depression in the soil. New splice ends will be cut at the time of connection. The controller shall be supplied with a penciled (not panned) schedule at time of installation. Electrical service shall not be tested by touching any charged wire to the circuit board or battery wires of the controller (an Ohm- meter is best used for such test). Every controller shall be grounded locally at its own mounted location (and not depend solely on a shared ground with other nearby equipment and utilities). The dedicated ground rod shall be set at the controller location and no further than 5' away.
8. All irrigation lines (main and lateral) shall be hydrostatically pressure tested at 125 p.s.i. with all joints and fittings clearly exposed. There shall be a pressure gauge at the pump and another at the furthest end of the section of the line that is to be tested. The line shall hold the required pressure for a minimum of four hours. If there is any drop in pressure, the line shall be retested until there is no drop in pressure. The lines shall be filled with water from the low end and the air expelled from the high point. All air must be removed from the line before the test shall begin. Testing the lateral lines will necessitate the capping of all risers. Such test will not be required for drip lateral lines or where marlex street elbows are employed in swing assemblies. An air pressure test at 125 p.s.i. can be substituted for a hydrostatic test for as long as it takes to walk the entire lines with all joints and fittings exposed upon advanced approval from the Superintendent.
9. A coverage test shall be made of the irrigation system via manual control or pre-timed control from the irrigation controller. Spot checks may be made by "bleeding" individual remote control valves, but this method shall not be substituted for an overall coverage test. Adjustments and cleaning of

irrigation components shall be made (including change out of nozzles) as needed, as a result of a coverage test and a new coverage test(s) subsequently made.

10. All tests are subjected to City inspection and approval by the Superintendent.

5.3.4 Soil Preparation and Fine Grade

1. All areas to be landscaped shall be prepared with specified soil conditioners, soil amendments and fertilizers and shall be thoroughly mixed with the topsoil in areas to be planted as lawns and groundcovers. All clumps and clods of topsoil shall be broken and mixed in.
2. All rocks, debris, and excess soil shall be removed from the site and disposed of in an approved manner and/or outside of the city.
3. Wherever possible topsoil native to the site shall be utilized as fill in the fine grading process. The contractor will have provided for stockpiles of native topsoil during mass grading. Though such topsoil will have been distributed, remnants of the stockpiles might be located and utilized.
4. Tops and toes of slopes shall be rounded to produce a gradual and natural appearing transition between relatively level areas and slopes.
5. Fine grade is to provide a smooth even finish and positive surface drainage without low spots or pockets. Undulations in slope-sides which result in specific grades steeper than the overall intended grade of the slope shall be corrected. Finish grade at edges shall lay the following inches below the level of pavement and header boards:
 - a) 1/4" – 1/2" for bare ground, hydroseeded, and non-mulched groundcovers
 - b) 1/2" – 3/4" for lawn areas
 - c) 1" – 2" for mulched areas
6. The site shall be checked to be sure that soil preparation and fine grading have not resulted in bringing subsoils to the surface or causing public and private properties to drain into each other. Any such problems shall be brought to the attention of the City.
7. All phases of soil preparation and fine grading are subject to City inspection and approval. The finish grade must be complete and irrigation system fully tested and operational before planting can begin.

5.3.5 Planting

1. All planting shall be performed as per all related standards and specifications and the approved landscape plan.
2. The contractor shall provide an experienced supervisor or foreman, capable of reading the landscape plans and related specifications and who is familiar with current California horticultural practices, to oversee all aspects of planting. Such a foreman shall concern himself/herself with close on-site supervision of the following:
 - a) Proper species identification and location.
 - b) Excavation of the planting pits with particular attention given to pit side scarification.
 - c) Identification and application rates of fertilizers and amendment (matched nursery container mix) to be used in the backfill mix.
 - d) Proper manipulation of the root ball to encourage future outward growth of roots.
 - e) Planting techniques which do not allow the root ball to be set too low or the root crown covered with backfill or siltation.
 - f) Approved staking and pruning techniques.

3. Planting pit amendment shall be matched to the nursery container mix unless otherwise specified in the project soils report and approved by the Superintendent. Any attempt to use other amendments will be rejected.
4. Whenever possible project plant material shall be contract grown and subject to nursery inspections by the Superintendent and Landscape Architect. This is especially applicable for projects with large quantities of the same container stock specimen to ensure uniformity of quality, stature and appearance.
5. Seeding for lawn areas shall be performed only during the warm months between March 1 and October 15. The lawn areas shall be free of weeds and debris and be fertile and friable the day of seeding. Seeding may be done either by double passes of a mechanical spreader or by hydroseeding. Mechanically sown seed shall be ranked into the surface and rolled. Either application shall be kept moist until full germination. Bare spots shall be reseeded at 10 day intervals until a full stand of grass is germinated and acceptable.
6. Sod can be laid in lawn areas any time during the year. The soil shall be in the same condition as for seeding and fertilizer applied the same day as sod delivery. Lay sod in a tight fitting staggered brick layer pattern against any grade. Rolls of sod shall be kept moist throughout installation. All sod shall be installed the same day as delivery. Keep sod moist until first mowing. Roll sod twice within two days of installation. Care shall be taken not to leave footprints in the soil surface or sod.
7. Ground covers taken from flats or rooted cuttings shall be planted in the bare soil surface prior to any mulching so as to ensure true root to soil contact. A staggered or triangular pattern shall be employed (unless otherwise instructed via the Superintendent). Specimens shall be placed in a pit of sufficient size to prevent roots from doubling over. Newly planted ground covers shall be kept moist. Care shall be taken not to plant within understories of low growing shrubs or right next to hardscape (paved) edges.
8. Areas (other than lawns, turf, selected groundcovers and hydroseeded wildflowers) shall be mulched.
9. Newly planted trees will have to be deep watered during hot months.
10. All specimen selections, substitutions, locations and planting are subjected to City inspection and approval.
11. Replacement plantings will be expected, no matter what caused the loss, at the end of the installation period and at the end of the one year establishment maintenance period. Seasonal considerations may necessitate adjusted replacements at other times.

5.3.6 Hardscape Installation – The subgrade of all areas in 2, 3 and 4 below shall be compacted to 90% and treated with an approved soil sterilant which shall remain stationary in the soil. Application of sterilant shall be that as recommended by the pest control advisor. Only a few hardscape surfaces are addressed in the below. Other surfaces shall be installed per drawings, specifications and best of industry practices.

1. Headerboards – Headerboards shall be installed true to line and finished grade and set flush with adjacent paving. Lengths shall be no less than 12 feet and stakes placed at intervals of 8 feet. All corner connections shall be mitered cut to receive each board as an exact fit and securely staked. All straight joints shall be spliced and securely staked.
2. River Cobble – A tight fitting random pattern of river cobble shall be set firmly into freshly poured mortar to half the depth of each individual cobble. Broken or odd shaped cobbles shall be discarded. All clean and smooth rounded cobble within 3 inches of the mean size of 5 inches shall be used. Cobble shall be lightly wetted just prior to placement. The planting side edge of the mortar shall be formed or troweled so as to present a smooth even edge. All spoil shall be removed

from the street, curb and planting bed. As the mortar begins to set-up the mortared cobble shall be sprinkled lightly with water so as to clean the cobble and settle the mortar surface. After mortar has cured all dirt and excess materials shall be cleaned off of the cobble and two coats of Thompson's clear sealer (or approved equal) shall be applied.

3. Decomposed Granite - Decomposed granite (with binder mixed in) shall be put true to grade and compacted to 92%. The finished surface shall have a smooth appearance and lay flush with any adjacent paving and headerboards.
4. Imprinted Concrete – The concrete shall be placed and screened to the proper grade and floated to a uniform surface in the normal manner. Bomanite Color Hardener (or approved equal) shall be applied evenly to the surface by the dry- shake method using a minimum of 60 pounds per 100 square feet. It shall be applied in two or more shakes, floated after each, and troweled only after the final floating. While the concrete is still in the plastic stage of set-up, the imprinting tools by Bomanite (or approved equal) shall be applied to make the desired patterned surface. Bomanite Color Curing Compound (or approved equal) shall be applied uniformly with a sprayer or roller. Coverage shall be approximately 1200 to 1300 square feet per gallon of solution. The cured surface shall be cleaned to remove residual dust or grout. At no time can acid or caustic solutions be used for cleaning. For the Bomanite process, only contractors certified by the Bomanite International Society may perform the work.

5.3.7 Pesticide Use – All applications shall be made in strict conformance with the pest control advisor's written recommendations, the manufacturer's label, latest science, industry standards for safe use and disposal, the City IPM Policy and the approval of the Superintendent (a licensed pest control advisor). Applications shall be made under the supervision of a licensed Applicator who is registered with and reporting to Contra Costa County Agriculture Commissioner.

5.4 Landscape Maintenance

5.4.1 General – Landscape maintenance shall be performed in compliance with applicable portions of any current or the most recent "Special Provisions" sections of a City of Richmond "Landscape Management Services" specifications, "California Landscape Standards; Section VII; Landscape Maintenance" by the CLCA, the "Monthly Maintenance Service Schedule", the Superintendent's "Directive # 11; Irrigation Maintenance", "Directive #13; Open Lawn Areas" and "Directive # 16; Plant Material Selections, Care and Management" and the "Park Maintenance Handbook; 1990" by the National Park Service as well as compatible project specifications for maintenance. Where there may be any conflicts between said specifications or standards the determination of the Superintendent will prevail. This is applicable as appropriate in any of the following maintenance periods:

1. Interim maintenance conducted during installation; this is required and is intended to protect investments already made in the landscape site while construction remains underway throughout. At no time can a notion of "substantial completion" be employed as grounds to proceed automatically to the next period below. Inspections and tests of a fully completed landscape as directed by the Superintendent are expected via satisfaction of punch list items. Replacement of any plant material failing or lost (for any reason) is possible as a result. As-built drawings are expected to be generated during this period and submitted to the Superintendent for approval (without exception), which is a condition required to be able to proceed to the next period below.

2. The one year establishment maintenance period; this is intended to bring the new landscape into acceptable grown and operational conditions suitable for turnover to the city for long term maintenance. This period may or may not necessarily coincide with warranty periods of specific materials and equipment installed in the landscape site. This period is not automatically ended exactly in one year. The contractor is expected to make timely requests to the Superintendent's representative to begin an orderly turnover process. Inspections and specific retests of this maintained site as directed by the Superintendent are expected via satisfaction of punch list items. Replacement of any plant material failing or lost (for any reason) is possible as a result. Specified items, including but not limited to cabinet keys, gate keys, door keys, irrigation schedules, quick coupler quills/hose bibs, warranty maintenance manuals, specialized tools and spare parts are required to be submitted directly to the Superintendent's representative as condition of turnover to the city for long term maintenance.
3. Long term maintenance conducted by City staff or by a City maintenance contractor; wherein all appropriate foresaid standards and specifications will apply. City forces cannot be comingled with that of the project contractor during construction and establishment maintenance prior to turnover for long term maintenance unless specifically approved by the Superintendent for mitigation of hazards or expediting code driven work.
4. Maintenance conducted by volunteers; this is intended to supplement and be strictly coordinated with hired maintenance forces under an Adopt-a-Park/Trail or Adopt-a-Tree program as directed by the Superintendent. This will usually commence during long term maintenance and only with concurrence of the contractor during construction and establishment maintenance.
5. Management and maintenance conducted by sports leagues; hired or volunteer work can be provided for a sports field or other outdoor facility by such groups under permit from the Recreation Department for the duration of an entire season or a tournament. At least ten weeks before the start of a sports season or tournament Recreation staff will direct the sport league representatives to meet with Parks & Landscaping staff designated by the Superintendent to determine what assistance they will jointly provide to initially improve and then maintain the facility to make it playable for that particular sport and events. This arrangement will then be memorialized with detail for responsibilities in the permit Recreation issues to the league. A concessionaire's agreement may also provide for complete management and maintenance of a sports facility acceptable to the city.
6. Maintenance conducted by another agency under agreement; such as exists with the City of El Cerrito for Central Park and with East Bay Regional Park District for Alvarado Park. City of Richmond staff or maintenance contractors cannot tend the property of another agency without fully executed agreement to do so. Nor can such City forces tend private property.

5.4.2 Non-irrigated planting – Non-irrigated plantings shall have an establishment maintenance period which encompasses two full rainy seasons (October 15 to April 15 twice). Some mitigation planting areas (usually with native endemic specimens) may require longer periods for maintenance and/or monitoring required by development agreement and/or regulatory agencies.

5.4.3 Specialized Monitoring Programs – During any maintenance period some third party monitoring and testing must be permitted and necessarily included. Such programs may include, but not be limited to the following:

1. Inspections conducted by the Contra Costa Agricultural Commissioner's office.
2. Inspections conducted by other regulatory agencies or their agents.
3. Warranty inspections conducted by manufacturer's representatives of equipment and materials.

4. Inspections and sampling conducted by a soils engineer.
5. Inspections conducted by a certified arborist or biologist.
6. Surveys and mapping.
7. GMX compaction testing of synthetic turf.
8. Playground equipment and surfacing inspections.
9. Water quality inspections.
10. Building inspections.
11. Utility company inspections and testing (with possible USA markings).
12. Conservator inspections of art or historic objects located in the landscape.

CITY OF RICHMOND STANDARD – RICHMOND MUNICIPAL CODE

Chapter 10.08 - TRIMMING, PRUNING, CARE, PLANTING, REMOVAL AND MOVING OF TREES, SHRUBS OR PLANTS

Sections:

10.08.010 - Superintendent defined.

As used in this chapter SUPERINTENDENT shall mean the Recreation and Parks Director of the City of Richmond or any of his authorized deputies.

(Amended by Ordinance No. 80 N.S.)

10.08.020 - Duty of Superintendent.

It shall be the duty of the Superintendent to plant, trim, prune and care for all trees, shrubs or plants in and upon any street, park, pleasure ground, boulevard, alley or public place of the City of Richmond. The Superintendent may charge a reasonable planting fee for each individual tree when said tree is planted at the request of any property owner or person responsible for care of said property, abutting upon any street, park, pleasure ground, boulevard, alley or public place of said city; to designate the kind of trees, shrubs or plants to be planted upon any street, park, pleasure ground, boulevard, alley, or public place of said City; provided, however, that the owners of property fronting on any street, alley or public place may petition the City Council of said City that such trees, shrubs or plants shall be a certain kind or variety, but such petition shall be merely advisory to the action of said Council.

(Amended by Ordinance No. 80 N.S.)

10.08.030 - Permit from Superintendent.

No person shall cut, trim, prune, plant, remove, injure or interfere with any tree, shrub or plant upon any street, park, pleasure ground, boulevard, alley or public place of the City of Richmond without a permit therefor from the Superintendent and the Superintendent is hereby authorized to grant such permission in his discretion but no such permit shall be valid for a longer period than thirty days after its date of issuance.

10.08.040 - Abutting property owners may file request for removal of trees, shrubs, etc.—Agreement to pay cost thereof.

Any person maintaining any overhead wires or any pipes or under ground conduits along or across any street, park, pleasure ground, boulevard, alley or public place of the City of Richmond, or owning any property abutting upon any street, park, pleasure ground, boulevard, alley or public place of said city, desiring to have any tree, shrub or plant, cut, trimmed, pruned or removed may file with the Superintendent a written request that such work be done and such request shall describe the work desired to be done and it shall be within the discretion of the Superintendent to require a written agreement upon the part of the petitioner to pay the cost thereof and to do such work in the way stipulated by the Superintendent before the issuance of any permit hereunder.

10.08.050 - Interference with Superintendent prohibited.

No person shall interfere with the Superintendent or persons acting under his authority while engaged in planting, mulching, pruning, trimming, spraying, treating or removing any tree, shrub or plant in any park, street, pleasure ground, boulevard, alley or public place of the City of Richmond, or in the removing of any stone, cement or other substance from about the trunk of any tree, shrub or plant in any such street, park, pleasure ground, boulevard, alley or public place.

10.08.060 - Actions damaging roots prohibited.

No person shall cause, authorize or procure any brine water, oil, liquid dye or other substance deleterious to tree life, to lie, leak, pour, flow or drip upon or into the soil about the base of any tree, shrub, or plant in any street, park, pleasure ground, boulevard, alley or public place of the City of Richmond or into any sidewalk, road, or pavement within said City of Richmond at a point from which such substance may be lying upon or by flowing, dripping or seeping into such soil injure such tree, shrub or plant. No person without the approval of the Superintendent shall place or maintain any stone, cement or other substance so that it shall impede the free access of water or air to the roots of any tree, shrub or plant in any street, park, pleasure ground, boulevard, alley or public place of the City of Richmond.

10.08.070 - Permission required for attachments to trees, etc.

No person without the permission of the Recreation and Parks Director of the City of Richmond shall attach or keep attached to any tree, shrub or plant in any street, park, pleasure ground, boulevard, alley or other public place in the City of Richmond or to the guard or stake intended for the protection thereof, any wire, rope, sign or any other device whatsoever.

10.08.080 - Protecting trees, etc. during building construction.

During the erection, repair, alteration or removal of any building, house or structure in the City of Richmond, no person in charge of such work shall leave any tree, shrub or plant in any street, park, pleasure ground, boulevard, alley or public place of the City of Richmond in the vicinity of such building or structure without such good and sufficient guards or protectors as shall prevent injury to said tree, shrub or plant arising out of or by reason of said erection, repair, alteration or removal.

10.08.090 - Building construction or removal necessitating trimming, pruning, etc.—Application for permit.

When the erection, repair, alteration or removal of any building, house or structure necessitates the trimming, pruning or removal of any tree, shrub or plant on any street, park, pleasure ground, alley or other public place of the City of Richmond, except any trimming, pruning or removal required by the construction of a residential driveway, it shall be within the discretion of the Superintendent to refuse permission to do such work. Applications for a permit to trim, prune or remove any tree or plant on any of the above mentioned places for the above mentioned reasons shall be filed with the Superintendent at least three days prior to the time of doing such work. The Superintendent may stipulate the conditions upon which any trimming, pruning or removal may be done and may require the applicant to enter into an agreement whereby said applicant shall agree to pay all costs incurred for any inspection, labor, equipment or service deemed necessary by the Superintendent.

10.08.100 - Moving of buildings—Procedure for protection of trees, etc.

No person shall move any building, house or portion thereof without notifying the Superintendent at least three days in advance of such moving. Said notice shall designate the route to be followed and all other details pertinent to such work. The Superintendent shall have the authority to change such route and designate one which in his opinion will cause less damage to trees, shrubs or plants owned by the City of Richmond along and adjacent to the said route. If necessary to protect such trees, shrubs or plants the Superintendent may require that said house, building or portions thereof be cut into segments small enough to fit the available width between such trees, shrubs or plants along the designated route. As a

condition to approving any route for the moving of any building, house or portion thereof, the Superintendent may require the person doing such work to enter into an agreement to pay all costs incurred for any labor, equipment or material used to protect or preserve such trees, shrubs or plants either before or after such moving.

10.08.110 - Trees, etc. constituting hazard or impediment to travel—Inspection, removal.

The Superintendent may inspect any tree, shrub or plant upon any street, park, pleasure ground, boulevard, alley or public place of the City of Richmond or any tree, shrub or plant standing on any private property which overhangs or projects into any street, park, pleasure ground, boulevard, alley or public place of the City of Richmond, to determine whether the same or any part thereof is in such condition as to constitute a hazard or an impediment to the progress or vision of anyone traveling on said street, park, pleasure ground, boulevard, alley or public place.

If in the opinion of the Superintendent any such tree, shrub or plant is hazardous to the traveling public or impedes the progress or the vision of said public on any such street, park, pleasure ground, boulevard, alley or public place, he may cause the same or such part or parts thereof as are hazardous or impediment to be trimmed or removed so as to remedy such condition. In addition, the Superintendent has the authority to order the replacement of any tree, shrub or plant upon any street, park, pleasure ground, boulevard, alley or public place of the City of Richmond which in his judgment has become so diseased, hazardous or responsible for property damage or so endangers public safety that it cannot be corrected without replacement. However, no such tree, shrub or plant shall be cut down or removed unless ten days notice in writing of this intention shall be given by the Superintendent to the owner, occupant or agent of said property.

If the owner, occupant or agent of such private property within seven days after receipt of such notice files his objection to such removal with the Superintendent, such tree, shrub or plant shall not be cut down or removed unless the Superintendent shall give such owner, occupant or agent a reasonable opportunity to be heard in support of such objection. If such objection is not sustained, the Superintendent shall order its replacement; however, said property owner, occupant or agent, if he is dissatisfied with the decision of the Superintendent, may, within ten days after the hearing, appeal such decision to the Council for a hearing thereon. The decision of the City Council in such matter shall be final.

Nothing contained herein shall be deemed to impose any liability upon the City of Richmond, its officers or employees, nor to relieve the owner of any private property from the duty to keep any tree, shrub or plant upon his property or under his control in such a condition as to prevent it from constituting a hazard or an impediment to travel or vision upon any street, park, pleasure ground, boulevard, alley or public place within the City of Richmond.

(Amended by Ordinance No. 80 N.S.)

(Source: Ordinance No. 1228)

10.08.120 - Damage to private property, etc.

Any person whose property is being damaged by any tree, shrub or plant which is located upon any street, park, pleasure ground, boulevard, alley or public place in the City of Richmond may petition the Superintendent requesting that he inspect the tree, shrub or plant involved. Upon inspection if the Superintendent finds that the tree, shrub or plant involved was responsible for the damage complained of, the Superintendent has the authority to order its replacement if in his judgment it has become so diseased, hazardous, responsible for property damage or so endangers public safety that it cannot be corrected without replacement. If in his judgment replacement is not required or necessary, he can order whatever correction is necessary to remedy the condition. If said tree, shrub or plant must be replaced, the purchase

of the replacement will be the responsibility of the abutting property owner. However, no such tree, shrub or plant shall be cut down or removed unless ten days notice in writing of this intention shall be given by the Superintendent to the owner, occupant or agent of said property.

If the owner, occupant or agent of such property, within seven days after receipt of such notice, files his objection to such removal with the Superintendent, such tree, shrub or plant shall not be cut down or removed unless the Superintendent shall give such owner, occupant or agent reasonable opportunity to be heard in support of such objection. At the hearing the complaining party may also state his position. If such objection of the property owner to the removal is not sustained by the Superintendent the Superintendent shall order its replacement.

Any person who is aggrieved by the decision of the Superintendent may, within ten days from the date of the decision, appeal such decision to the City Council for hearing thereon, and the decision of the City Council in such matter shall be final. However, if the Council orders any tree, shrub or plant to be replaced which was not so ordered by the Superintendent, the Council shall make findings that such tree, shrub or plant has become so diseased, hazardous, responsible for property damage or so endangers public safety that it cannot be corrected without replacement.

(Added by Ordinance No. 80 N.S.)

CITY OF RICHMOND STANDARD – RICHMOND MUNICIPAL CODE

Chapter 12.29 - STREET OPENING AND PAVEMENT RESTORATION REGULATIONS – Abbreviated Section

Sections:

12.29.010 - Purpose. . .

The public right-of-way is a unique public resource held in trust for the benefit of the public. This physically limited resource requires proper management to maximize its efficiency and minimize the costs to taxpayers, to protect against foreclosure of future economic expansion because of premature exhaustion of the public right-of-way, and to minimize the inconvenience to and negative effects on the public from use of the public right-of-way by contractors and utility companies.

To achieve the purpose of this chapter, the City of Richmond shall endeavor to coordinate its Capital Improvement Programs with those of utility companies and franchisees with facilities in, on, under or above the public right-of-way. Information about any planned work in the right-of-way shall be shared at the earliest possible time. Utility owners and franchisees are encouraged to coordinate their street excavations so that all work is done simultaneously and the street is not excavated more than once within a twelve-month period.

(Ord. No. 39-09 N.S., § I, 12-1-2009)

12.29.020 - Definitions.

As used in this chapter:

"Agency" means the Richmond Community Redevelopment Agency, a public body corporate and politic.

"Arterial street" means any street with a traffic volume of 7,500 to 15,000 vehicles per day, including Barrett Avenue, Castro Ranch Road, Garrard Boulevard, Harbour Way, MacDonald Avenue, Pennsylvania Avenue, Potrero Avenue, Rheem Avenue, Seventh Street, Solano Avenue, and Thirty-Seventh Street.

"Asphalt concrete" or "AC" means blend of aggregate and asphalt binder meeting the specifications set forth in the City of Richmond Standard Specifications Section 39, "Asphalt Concrete" and the Caltrans Standard Specifications Section 39, "Asphalt Concrete."

"Chip seal" (see the definition of "Slurry seal").

"City" means the City of Richmond, a charter city and a municipal corporation duly organized and validly existing under the laws of the State of California, and all departments, divisions, and offices thereof.

"Encroach" means constructing or placing temporary or permanent structures, improvements, facilities or materials in, on, over, or under any public right-of-way or using any right-of-way so as to prevent, obstruct, or interfere with the normal use of that way, including but not limited to the performance of any of the following acts:

- (1) Excavating or disturbing the public right-of-way;
- (2) Erecting or maintaining any post, sign, pole, fence, guard-rail, wall, pipe, conduit, cable, wire, communication service equipment, or other facility or structure on, over, or under a public right-of-way;
- (3) Planting any tree, shrub, grass, or other growing thing within the public right-of-way;

- (4) Placing or leaving on the public right-of-way any rubbish, brush, earth, or material;
- (5) Constructing, placing, or maintaining on, over, under, or within a public right-of-way any pathway, sidewalk, driveway, or other surfacing; any culvert or other surface drainage or subsurface drainage facility; or any pipe, conduit, wire, communication service equipment or facility, or cable;
- (6) Constructing, placing, planting, or maintaining any structure, embankment, excavation, tree, or other object adjacent to the public right-of-way which causes or may cause an encroachment.

"Engineer" means the City Engineer, his or her designee.

"Excavation" means any trench cuts within the street right-of-way to access or install a utility line or any related facility in excess of four (4) square feet or four (4) feet long, whichever is smaller. All such excavations shall require an encroachment permit.

"Excavator" means the applicant/permittee to whom an encroachment permit is issued for the purposes of excavation.

"Facility" means any fiberoptic, coaxial, or copper cable; communication service equipment; telephone, telecommunications, electric or other wire, line or equipment; utility structure; oil, gas, or other pipeline; duct; conduit; cabinet; tunnel; vault; drain; manhole; splice box; surface location marker; pole; subsurface tiebacks; soil nails; stairs; access ramps; subsurface foundations; landscape features, including curbs around planter areas; planter boxes; clocks; bus shelters; phone booths; bike racks; fencing; retaining walls; benches; stockpiles; building materials; and other appurtenances or tangible things located in, upon, above, beneath, or across any public right-of-way.

"Major arterial street" means any street with a traffic volume of more than 15,000 vehicles per day, including Carlson Boulevard, Central Avenue, Cutting Boulevard, Hilltop Drive, May Road, Robert H. Miller Drive, San Pablo Avenue, San Pablo Dam Road, Thirteenth Street, Twenty-Second Street, and Twenty-Third Street.

"Major defects" means any defects greater than the deficiency tolerances specified in the City of Richmond Standard Plans and Details; the Caltrans Standard Specifications and Details; or Individual Contract Plans and Specifications.

"Micro paving" (see the definition of "Slurry seal").

"Micro surfacing" (see the definition of "Slurry seal").

"Permittee" means any person, contractor, utility or special district that has been issued a permit pursuant to this chapter, including any lawful successor, transferee, or assignee of the original permittee. All obligations, responsibilities, and other requirements of the permittee shall be binding on successors in interest of the original permittee.

"Person" means any natural person, firm, joint venture, joint stock company, partnership, association, club, company, corporation, business trust, organization, or the manager, lessee, agent, servant, officer, or employee of any of them or any other entity which is recognized by law as the subject of rights or duties, not including the City of Richmond, the Richmond Community Redevelopment Agency, or the City's or Agency's officers, employees, or agents.

"Prohibition street" means streets that have been reconstructed or resurfaced within the past three to five years (see Section 12.29.030.A, below).

"Public right-of-way" means the area in, upon, above, beneath, or across any land or interest which by deed, conveyance, agreement, easement, dedication, usage, or process of law is reserved for or dedicated to the use of the general public for travel, and includes any public street, road, highway, freeway, bridge, lane, court, alley, boulevard, sidewalk, median, parkway, or emergency vehicle easement.

"Public street" means the full width of the surfaced or travel portion, including shoulders, of any road, street, path, lane, or alley dedicated to, reserved for, or used by or for the general public when those roads, streets, paths, lanes, and alleys have been accepted as and declared to be part of the City system of public streets, except highways forming a part of the State highway system.

"Slurry seal" means a mixture of polymer modified asphalt emulsion, mineral aggregate, mineral filler, water, and other additives, properly proportioned, mixed, and spread in accordance with the City of Richmond Standard Plans and Details and the Caltrans Standard Specifications; usually less than ½ inches in thickness.

"Special district" means any agency of the State for the local performance of governmental or proprietary functions within limited boundaries, and includes a county service area, a maintenance district or area, an improvement district or improvement zone, or any other zone or area within which a property tax or assessment will be levied to pay for a service or improvement benefitting that area.

"Street overlay" means one or more courses of asphalt construction on an existing pavement; usually greater than ½ inches in thickness; generally includes an asphalt leveling course to correct the contour of the old pavement.

"Structure" means any physical alteration or improvement, including but not limited to a building, post, cabinet, fence, vault, sign, pole, guard rail, wall, facility, pedestrian walking path, sidewalk, driveway, track, surfacing, culvert, drainage facility, pipe, embankment, or excavation.

"Underground utility district" has the meaning set forth in Chapter 12.48 of the Richmond Municipal Code.

"Utility" means any person or entity providing electricity, gas, telephone, telecommunications, water, or other services to customers, and which pursuant to State law or local franchise is entitled to install its facilities in the public right-of-way.

"Wearing surface defects" mean the defects in the surface of a roadway that is in direct contact with traffic and that resists the resulting abrading, crushing, or other disintegrating action.

(Ord. No. 39-09 N.S., § I, 12-1-2009)

12.29.030 - Prohibition period.

- (a) Newly constructed or resurfaced streets shall be termed "prohibition streets" within this section. Permission to excavate in prohibition streets will not be granted for five (5) years after the completion of street overlays. An overlay consists of at least a ½-inch thick layer of asphalt. For those streets with chip seal, slurry seal coating, or micro paving with less than ½ inch of new pavement, the prohibition period shall be for three (3) years. Utilities shall plan well enough in advance to determine alternate methods of making necessary repairs to avoid excavating in newly resurfaced streets. Exceptions to the above policy are as follows:
 - (1) Emergencies that endanger life or property.
 - (2) Interruption of essential utility service.
 - (3) Work that is mandated by City, State, or Federal law.
 - (4) Service for buildings where no other reasonable means of providing service exists.
 - (5) Situations in which no alternative course of action exists, as determined by the engineer in writing setting forth the facts giving rise to the conclusion that no alternative exists.
- (b) To excavate in a prohibition street a waiver must be obtained.

- (1) To request a waiver, the applicant must submit a written request to the engineer. The request must include:
 - (A) The location of the excavation.
 - (B) Description of the work to be performed.
 - (C) The reason(s) the work was not performed before the street was paved.
 - (D) The reason(s) the work cannot be deferred until after the prohibition period.
 - (E) The reason(s) the work cannot be performed at another location.
 - (F) The reason(s) it is justified to excavate the prohibition street.
- (2) Any excavation in prohibition streets will be repaired with full lane width paving on the street as follows (refer also to Section 12.29.070, Paving):
 - (A) Overlaid or reconstructed streets: All lanes that are affected shall be ground down 2 inches and repaved with 2 inches of asphalt concrete, OR all lanes that are affected shall be resurfaced per Section 12.29.070, Paving.
 - (B) Slurry sealed, chip sealed, or micro surfaced streets: All lanes that are affected shall be resurfaced per Section 12.29.070, Paving.
 - (C) A minimum of one (1) feet on either side of the trench shall be resurfaced if the excavation is a lateral cut. For longitudinal trenches the entire length plus one (1) foot on either end shall be resurfaced.
 - (D) Exception: Full lane width restoration shall not be required if either of the following conditions apply:
 - (i) The work is not considered an excavation as defined in Section 12.29.020.
 - (ii) The work is being performed on behalf of a low-income household in order to bring an owner-occupied single-family residence into compliance with sanitary sewer regulations at any time other than as part of the sale of the residence. Low-income is defined as 80% of area median family income. The purpose of this exception is to prevent hardship to property owners of limited means and it shall be interpreted and applied solely to achieve that purpose.
- (3) Before issuing a permit for work in a prohibition street, the engineer will verify that the applicant has analyzed all feasible alternatives to make the necessary repairs using a trenchless method in prohibition streets to avoid excavating a newly resurfaced street whenever possible.

(Ord. No. 39-09 N.S., § I, 12-1-2009)

12.29.040 - Permits.

- (a) Any and all construction work within the public right-of-way shall require an encroachment permit. Anyone doing excavation work within the City of Richmond public right-of-way shall obtain a street cut permit for the purpose of excavation in addition to any other required permits. The contractor performing the work shall apply for the permit.
- (b) The permit application may be obtained from the City of Richmond Engineering Services Department.
- (c) Prior to applying for a street cut permit, the excavator must register with the City of Richmond. The contractor performing the work shall apply for the permit. The following must be provided to register for an excavation permit:

- (1) A cash deposit equal to five hundred dollars (\$500) or 25% of the value of the work (whichever is greater) as a warranty bond. Companies working under a franchise agreement that includes a bond are not required to post the cash deposit unless/until they have been issued a notice or citation for a violation by the City of Richmond standards or permit requirements.
 - (2) A current City of Richmond Business License.
 - (3) Current evidence of insurance.
 - (4) 24-hour phone number for emergencies.
 - (5) The name, telephone number, and mailing address (fax number, cell phone, and e-mail address if available) of the person who will receive all office correspondence from the City of Richmond.
- (d) All applications shall include plans indicating the following:
- (1) Name of the street to be excavated and the nearest cross street.
 - (2) Distance of proposed excavation from the face of curb.
 - (3) Distance of proposed excavation from the intersection.
 - (4) The size of the excavation (length and width).
 - (5) The location of any above ground facilities to be installed, showing:
 - (A) Distance from curb and any street facilities/furnishings.
 - (B) Purpose of the facility.
 - (C) Size of the facility.
 - (D) Location of doors and door swings.
 - (6) The location of any existing underground facilities and the location of underground facilities to be installed showing:
 - (A) Conduit vaults, maintenance holes, pipes, etc.
 - (B) Structural detail and additional information for structures to be installed such as vaults and maintenance holes.
 - (C) The construction method of the structure to be installed.
 - (D) Construction detail, location, size, design criteria and the purpose of the facility to be installed.
 - (7) Cross section of a typical trench indicating:
 - (A) The approximate depth of the facility to be installed.
 - (B) Trench backfill depth, compaction and layer depths.
 - (C) Pavement section detail (type and depths).
 - (D) Plans, structural details, and trench cross section must be signed and stamped by a licensed civil engineer, when legally required.
 - (8) The plan may show the approximate location of the excavation provided that on an "as-built" plan, the exact location of the excavation is shown. The "as-built" plan shall be submitted prior to the permit being finalized.
 - (9) A traffic control plan.

- (e) All excavation permit fees are due at the time the permit is issued. These fees represent the value of staff time in processing a permit application and are non-refundable.
 - (1) All past due fees, fines and penalties owed by the applicant must be paid before a permit will be issued.
 - (2) If a permit violation occurs no other application will be processed until the fines and penalties have been paid and all permit conditions are met.
- (f) If an account is past due or not in good standing, a permit cannot be issued until the account is brought into good standing. To bring the account to good standing, all fees and fines must be paid.
- (g) As a condition of the permit to excavate, the applicant shall provide evidence of an inquiry identification number issued by a regional notification center (Underground Service Alert, USA) pursuant to Section 4216, California Government Code.
- (h) Permittees and excavators shall pay close attention to the location and alignment of all USA markings while performing their work.
USA Codes are:

Electric	Red
Gas-Oil	Yellow
Communication-CATV	Orange
Water	Blue
Sewer	Green
Temporary Survey Markings	Pink
Proposed Excavation	White

- (i) If an excavator damages other facilities during their excavation work the excavator will need an additional street cut permit if additional excavation and trenches are needed to repair the damaged facility. The original permittee shall maintain the site and restore the pavement and any affected signage or striping.
- (j) Except in an emergency, street cut permits shall be taken out in advance of excavation work. An emergency is considered to exist only when life or property is endangered or when an essential utility service is or may be interrupted during weekends, holidays, or between 5:00 p.m. and 8:00 a.m. of normal working days.
- (k) In the event of an emergency, the excavator shall notify the City of Richmond and apply for a street cut permit for "emergency work" within four (4) hours after the City of Richmond's office opens.
- (l) Pre-construction meeting:

- (1) A pre-construction meeting shall be held for all projects that are scheduled to take longer than 15 working days to complete.
 - (2) The owner, contractor, any other agency that is involved and the City of Richmond shall attend this meeting.
 - (3) For projects that are supposed to be completed within 15 days, and are not completed within the allowed time, the City may issue administrative citations if a pre-construction meeting was not held.
 - (4) The traffic control plan shall be approved prior to the pre-construction meeting.
- (m) Permit duration shall be indicated on the permit:
- (1) All permits shall include estimated start and completion dates. A permit is valid from the construction start date specified on the approved permit until the specified completion date.
 - (2) Excavation permits are not valid if other required permits are not obtained or required notifications are not given.
 - (3) No disruption of traffic is allowed after 4:00 p.m. and before 8:00 a.m. unless specifically approved for these hours.
 - (4) Some permits may be valid on specific dates. They may be approved with special conditions specifying dates:
 - (A) When work shall be done.
 - (B) When work shall be completed.
 - (C) Before which work shall not start.
 - (5) Permits expire and become void, unless otherwise amended:
 - (A) Sixty (60) days after the start date, if no work has begun.
 - (B) If the work is not diligently proceeding and there are delays of more than four (4) working days after the work has started, unless the delays are caused by weather or other circumstances beyond the permittee's control.
 - (C) When the excavation, including the trench restoration, is completed or on the date specified on the permit as the expiration date.
 - (6) The work is determined to be proceeding diligently if:
 - (A) After a project begins, work continues on a regular basis, except for weekends, holidays, inclement weather, labor disputes, or any emergency beyond the control of the permittee.
 - (B) The permittee ensures that all necessary materials and supplies are on hand and ready for use so as not to delay the excavation and the prompt restoration of the public right-of-way.
- (n) A valid permit may be extended by requesting an extension prior to the expiration date by specifying the dates that need to be changed and explaining the reason for the extension. The engineer reserves the right to deny a request for extension.
- (o) If an application has been withdrawn or an approved permit is cancelled prior to the start of work the applicant or permittee may request a refund of the bond funds; all other permit fees are non-refundable.
- (1) To request a refund, submit a written request to the engineer.
 - (2) The request shall include:

- (A) The reason for cancellation or withdrawal.
 - (B) The permit number.
- (p) By accepting a street cut and/or encroachment permit, the permittee and the owner of the facility(ies) for which the permit has been issued agree:
- (1) To follow all laws, rules, regulations, and permit conditions.
 - (2) To assure that their employees, contractors, and subcontractors, comply with all laws, rules, regulations, and permit conditions.
 - (3) To indemnify the City of Richmond against all claims for personal injury or property damage that may arise in connection with the work.
- (q) The street cut and/or encroachment permit shall be available during work periods at the excavation site, until the project is completed and approved by the engineer. Permit(s) shall be shown to the City of Richmond employees upon request.
- (r) The excavator shall provide public notifications when excavating in the public right-of-way.
- (1) Minor projects lasting longer than 48 hours but less than 15 working days shall provide 11" x 17" posters with 1-inch minimum letters at the beginning and end of the project and every 300 feet between the beginning and the end of the project. Notes must contain:
 - (A) The names, address, and telephone number of the owner and the permittee.
 - (B) The start and completion dates of the project.
 - (2) Major projects lasting 15 working days or longer, the excavator shall:
 - (A) After the permit has been issued and at least five but no more than 30 calendar days before the anticipated start date of work, mail or deliver written notice to:
 - (i) Residents and occupants along the affected street.
 - (ii) Schools, churches, and other assembly uses within 300 feet of the affected street.
 - (iii) The City of Richmond Engineering Services and Public Works Departments.
 - (B) At least five calendar days but not more than 15 calendar days prior to starting work, post and maintain 11" x 17" notices in accordance with paragraph (r)(1) above. The notices must contain:
 - (i) The name, address, and telephone number of the owner and the permittee.
 - (ii) A description of the project.
 - (iii) The start and completion dates of the project.
 - (iv) The name, address and 24-hour telephone number of a contact person.

(Ord. No. 39-09 N.S., § I, 12-1-2009)

12.29.050 - Excavation material.

- (a) Pavement shall be cut to a straight, neat, vertical line prior to excavation.
- (b) All excavated material shall be removed from the job site within twenty-four (24) hours.
- (c) Every trench must be backfilled or covered by trench plates the same day. The City may issue administrative citations or pursue any other legal remedy if the trenches are not properly covered or

backfilled in a timely manner. Backfill must meet the requirements specified in Section 12.29.060 of this chapter.

(Ord. No. 39-09 N.S., § I, 12-1-2009)

12.29.060 - Backfill.

- (a) Trenches shall be backfilled with Class 2 Aggregate Base as specified in the Caltrans Standard Specifications Section 26, "Aggregate Base" or suitable material as required by the City of Richmond Standard Plans and Specifications. Compaction of backfill shall be in accordance with the City of Richmond Standards.
- (b) When undermining occurs, remove existing pavement as required to compact the backfill and restore the pavement.
- (c) Compaction tests shall be certified by an independent laboratory and submitted to the engineer, who may require the contractor to recompact and retest until the test results show that proper compaction is being achieved.

(Ord. No. 39-09 N.S., § I, 12-1-2009)

12.29.070 - Paving.

- (a) Trenches shall be paved in accordance with the City of Richmond Standard Plans and Specifications. After the trench has been backfilled, and immediately prior to placing asphalt concrete, the existing asphalt concrete shall be saw cut, or milled according to City of Richmond Standards, to a vertical face. The cut shall be a "T-Cut" according to City of Richmond Standards and the new asphalt concrete paving shall be butt joined to the existing asphalt concrete vertical face. No feathering of new paving to existing paving is allowed. The vertical faces shall be tack coated. In prohibition streets, placement of the final two (2) inches of asphalt concrete wearing surface shall be done by a paving machine or spreader box. Asphalt concrete shall be delivered and compacted in accordance with the City of Richmond Standard Plans and Specifications.

To allow for proper placement of the new pavement section, damaged pavement outside of the original trench cut lines shall be removed by cutting in lines perpendicular to or parallel to the original trench lines. No diagonal cuts are to be made. Undamaged pavement of three (3) feet or less between two damaged areas shall also be removed.

- (b) For trenches in recently paved prohibition streets, the entire lane shall be key-cut two (2) inches deep, and repaved with asphalt concrete unless the engineer gives written authorization to resurface with a polymer modified slurry seal instead. Authorization from the engineer to use slurry seal instead of asphalt concrete shall set forth the reasons for the authorization.
- (c) For trenches in recently slurry sealed prohibition streets, the entire lane shall be resurfaced with polymer modified slurry seal.
- (d) Trenches in concrete streets shall be repaved with concrete. The thickness of the new pavement shall be equal to the thickness of the existing pavement with the minimum thickness to be six (6) inches in the roadway.
- (e) Trenches in arterial and collector streets shall be paved with not less than six (6) inches asphalt concrete or match the existing pavement thickness (whichever is greater).
- (f) Pavement shall be restored within fourteen (14) working days from the time the entire trench is backfilled, unless delay is excused due to circumstances beyond the contractor's control, such as

inclement weather. For minor excavations such as service installations, the pavement shall be restored within thirty (30) working days from the time the entire trench is backfilled, unless delay is excused due to circumstances beyond the contractor's control, such as inclement weather.

- (g) Asphalt pavement shall be compacted to obtain a minimum of ninety-five percent (95%) relative compaction. The asphalt concrete wearing surface shall have no irregularity greater than five-sixteenths of an inch (5/16") in ten feet (10') in any direction.
- (h) On all streets steel plates shall be used to facilitate traffic flow and to protect the excavation until finish pavement is restored. Steel plates used to bridge a street opening shall be ramped to the elevation on the adjacent pavement and secured against movement in any direction. Temporary ramps shall be constructed of asphalt and shall have a gradual 30:1 slope or flatter using asphalt cutback.
- (i) All painted USA markings shall be removed by the permittee after the work has been completed.
- (j) All damaged pavement markings and striping shall be replaced and restored by the permittee.

(Ord. No. 39-09 N.S., § I, 12-1-2009)

12.29.080 - Defects.

- (a) Depressed trench pavement shall be repaired as follows:
 - (1) Wearing surface defects—Remove and restore wearing surface.
 - (2) Major defects—Excavate, remove and restore surface and base.The permit inspector will determine the severity of the defect.
- (b) Work not in compliance with the above requirements shall be rejected, removed, and redone by the permittee to the satisfaction of the engineer.
- (c) The owner of the facility/utility company is responsible for any roadway defects in the area over and adjacent to the trench appearing after the permittee restores the trench. The owner is responsible for maintenance, repair or reconstruction of the excavation site's affected area until the City of Richmond reconstructs, repaves, or resurfaces the street.
- (d) If there is a trench-related failure after the City of Richmond reconstructs, repaves, or resurfaces the street, the owner of the facility/utility company is responsible for its repair if the failure occurs within 1 year of a trench repair.
- (e) When the City of Richmond determines that an excavation or a defect is hazardous or constitutes a public nuisance or other imminent threat to public health, safety, or welfare, the engineer may order the responsible party to remedy the condition immediately.

If the responsible party refuses or fails to make the needed repairs immediately, the City of Richmond will make the repairs and:

- (1) The responsible party will be charged all the actual costs including administration, construction, consultant fees, equipment, inspection, notification, and remediation made necessary by the action or inaction of the permittee.
- (2) The repair or restoration by the City of Richmond does not relieve the responsible party from liability for future pavement failures.
- (3) If the responsible party fails or refuses to pay the restoration cost, the City may use any legal means to recover the costs, including but not limited to property liens and/or court action.

(Ord. No. 39-09 N.S., § I, 12-1-2009)

12.29.090 - Violations—Revocation and other penalties.

Any violation of this chapter may be enforced either as an infraction or as a misdemeanor, or by any remedy available to the City under this Code or under State law. Potential enforcement measures include but are not limited to the following:

- (a) Fine. If a City inspector finds that a contractor has committed any of the following violations then the contractor may be required to pay a fine or penalty for his or her actions. The penalties for violations are listed in the City's Master Fee Schedule.

VIOLATIONS	PENALTIES (Not to exceed amount shown)
1. Working without a permit.	Administrative citation, stop work, and apply and pay for the required permit
2. Excavation without providing public notice.	Administrative citation and stop work
3. Beginning a "Major Project" without having a pre-construction meeting.	Administrative citation
4. Violation of permit conditions.	Administrative citation
5. Improper site protection: improper plating, path of travel, barricading, etc.	Administrative citation
6. No permit on site.	Administrative citation
7. Improper trimming of trench.	Administrative citation
8. Any trench left open after the allowed work hours that is not backfilled and covered.	Administrative citation
9. Improper public notice: no notice sign, wrong	Administrative

information on sign/notice.	citation
10. Non-compliance with trench restoration requirements.	Administrative citation
11. Improper housekeeping: failure to remove spoil, dirty site, no sweeping, etc.	Administrative citation
12. Other excavation code violations.	Administrative citation

The above fines, when assessed, shall be deducted from the cash deposit required by 12.29.040(e)(1) of this section or will be paid by the applicant if there is not a cash deposit.

- (b) Suspension. Whenever the engineer finds that a suspension of an encroachment permit is necessary to protect the public health or safety from imminent danger, the engineer may immediately suspend any such permit pending a hearing for remedial action or revocation. The engineer shall, within three (3) working days of the emergency suspension, give a written notice of such suspension to the permittee, by personal service or by first class mail, postage prepaid, to the last known address of the permittee. The permittee may, within fifteen (15) days after service of such a written notice of suspension, file with the City Manager a request for hearing regarding the suspension. The City Manager or his or her designee shall schedule a hearing on the suspension within five (5) working days of receipt of a request for hearing. If the City Manager or his or her designee, after the hearing, finds that the public health or safety requires correction or alteration of any condition caused by, or existing on the site of the encroachment, he or she shall issue one or more of the following:
- (1) An order to correct any particular noncompliance.
 - (2) A revocation of the encroachment permit.
 - (3) A continued suspension of the encroachment permit, until such time as the dangerous condition is corrected.
 - (4) A modification or reinstatement of the encroachment permit, with conditions as necessary to prevent harm to the public.

The City Manager or his or her designee shall, within ten (10) days of the hearing, render a written opinion, stating the findings upon which the decision is based, and the action taken. The decision of the City Manager or his or her designee shall be final, except a decision to revoke the permit which may be appealed to the City Council in accordance with Section 12.30.060.B of this Code.

- (c) Revocation. The engineer may recommend that the City Manager revoke a permit where he or she finds that:
- (1) The permittee has violated any provision of this Code or conditions of the permit; or
 - (2) The permittee has failed to pay any required fees, or to post or maintain any bond or insurance required by this chapter; or
 - (3) The encroachment for which the permit was granted adversely affects the safety, capacity, or integrity of the City's public right-of-way or increases the City's liability exposure; or

- (4) The encroachment is causing the City to incur substantial additional maintenance costs; or
- (5) Material misrepresentations, omissions, or inaccuracies were made in the application for the permit.

The engineer shall give the permittee at least ten (10) days' written notice of a hearing before the City Manager or his or her designee on the proposed revocation of a permit issued pursuant to this chapter, setting forth the grounds for such action. If, after reviewing all evidence presented before or at the public hearing, the City Manager or his or her designee makes any one of the five findings set forth above, he or she may revoke the permit. The City Manager or his or her designee shall, within ten (10) days after the close of the hearing, render a written opinion, stating the findings upon which the decision is based, and the action taken. The decision of the City Manager or his or her designee may be appealed to the City Council in accordance with Section 12.30.060.B of this Code.

(Ord. No. 39-09 N.S., § I, 12-1-2009)

CITY OF RICHMOND STANDARD – RICHMOND MUNICIPAL CODE

Chapter 12.36 - MAINTENANCE AND CONSTRUCTION OF SIDEWALKS, DRIVEWAYS, CURBS AND GUTTERS

Sections:

12.36.010 - Title.

This chapter shall be known as the sidewalk ordinance.

12.36.020 - Scope.

This chapter sets forth rules and regulations to control the repair and construction of sidewalks, driveways, curbs and gutters, and the removal of obstructions from sidewalks, driveways, curbs and gutters; establishes the administrative procedures for issuance of permits; and provides for the control of obstructions placed where the construction, alteration or repair work is performed for the purpose of safeguarding persons and property against unreasonable hazards resulting from uncontrolled construction practices, in the interest of public health, welfare and safety.

12.36.025 - Property owner responsibility to repair and maintain sidewalk.

- (a) The owner of a parcel of real property which fronts on any portion of a sidewalk between the property line of the parcel and the street line, including the parking strip and the curb, is responsible for the repair and maintenance of the sidewalk and shall pay the cost and expense of repair and maintain said sidewalk area whether or not the City has notified the owner of the need for such repairs or maintenance or has performed similar repairs or maintenance in the past.
- (b) The owner of a parcel of real property is under a duty to members of the general public, including but not limited to users of the sidewalk, to keep the portion of any sidewalk described in subsection (a) in a safe condition.
- (c) The failure of the owner to fulfill the duties imposed by subsections (a) and (b), or the performance of such duties and obligations by the owner in a negligent manner, shall constitute negligence. An owner shall be liable to any member of the general public injured on or by a sidewalk area if the owner's negligence hereunder is a proximate cause of the injury. The City shall not be liable for an injury caused by the negligence of an owner.

(Ord. No. 14-00 N.S., § 1, 5-9-2000)

12.36.030 - Actions prohibited.

It is unlawful for any person to perform any work within the scope of this chapter except for the removal of obstructions, without first having obtained a permit from the department of public works pursuant to this chapter.

12.36.040 - Guarantee deposit fee.

A licensed concrete contractor desiring a permit pursuant to this chapter must first deposit with the director of public works of the City of Richmond a guarantee deposit fee as hereinafter provided. No fee is required when a homeowner desires a permit pursuant to this chapter to do work on the frontage of his own home.

The guarantee deposit shall be retained by the City of Richmond for a period of twelve months after the date of the completion of the work called for in the last permit issued, and no permit shall be issued unless such guarantee deposit shall be reimbursed by the depositor for any deductions made as provided in this chapter. If within twelve months after the completion of the work called for in any permit the sidewalk and/or curb and gutter and/or driveway should break, disintegrate or otherwise fail to comply with the provisions of this chapter, the director of public works shall notify the person making the deposit of such break, disintegration, or failure, and specify the repairs needed or work to be done, and such person shall, within ten days from the date of such notice, make such specified repairs. If such repairs are not made within the fixed time, the same may be made by the director of public works and the cost thereof shall be paid from the guarantee deposit on hand with the City.

After a lapse of twelve months from the date of completion of work called for in the last permit issued to any permittee, upon written demand of such permittee, or his successors or assigns, where such transfers or assignment is made in the manner as hereinafter provided, accompanied by a certificate from the director of public works stating that all needed repairs have been made, and that all the conditions of this chapter have been complied with, the City of Richmond shall return the guarantee deposit, or such portion thereof as may remain after deduction of all fees for repairs and work done as aforesaid, to the permittee or his said successors or assigns.

(Amended by Ordinance No. 58-79 N.S.)

12.36.050 - Transfer of guarantee deposit.

The guarantee deposit may be transferred to another party where such transfer is made pursuant to a judgment of court, or by an agreement of dissolution of a partnership or upon a bona fide sale of the business of the person having ceased to do work under the permit, and entitled to a return of the deposit as provided in this chapter. In the event of any transfer, the receipt for such deposit, or satisfactory proof of the loss of same, must be delivered to the director of public works for verification. No transfer shall be made of the deposit other than as provided in this section.

In the event of a transfer of the guarantee deposit, such transfer shall in no way affect the liability of the deposit for any work done by the person transferring the deposit, nor shall it in any way affect the liability of such person under the provisions of this chapter.

12.36.060 - Permit.

The director of public works shall charge a fee for each and every permit issued, in addition to inspection and engineering fees as hereinafter provided in this chapter. In no case shall a permit be granted to construct sidewalks, curbs and/or gutters where the council has declared its intention to construct such sidewalks, curbs and/or gutters under the general laws of the State of California, and also provided that in the event any of the terms or conditions of this chapter are not complied with, no further permit shall be issued to such person while noncompliance continues to exist, or while such person is indebted to the City of Richmond for money expended in accordance with the terms and conditions of this chapter.

12.36.070 - Inspection—Fee.

It shall be the duty of the director of public works to cause an inspection to be made of sidewalks, driveways, curbs and gutters constructed under the permit, to ascertain whether such work is being done, or has been done, in accordance with the provisions of this chapter and the permit issued therefor.

The director of public works shall charge an inspection fee for all installations of sidewalk, driveway, curb or gutter as hereinafter provided.

(Amended by Ordinance No. 58-79 N.S.)

12.36.080 - Transfer of permit for construction of sidewalks, driveways, curbs or gutters.

No construction and/or repair of sidewalks, driveways, curbs and/or gutters to be performed under a permit issued pursuant to this chapter shall be performed except by or under the supervision of the designated permittee, who shall also be the person who is responsible to the owner or contractor for the work. In the event that it shall be ascertained that any work is being done, or has been done, under a permit issued to anyone other than the person responsible to the owner for the work, and in the event it shall be proven that the use of the permit was with the knowledge and consent, express or implied, of the designated permittee, then the guarantee deposit made by such permittee shall become forfeited to the City of Richmond.

12.36.090 - Control of work—Construction of sidewalks, driveways, curbs and gutters—Compliance with permit and adopted specifications.

All sidewalks, driveways, curbs and/or gutters must be repaired and/or constructed in every particular in accordance with the permit therefor issued; must be completed within thirty days from the date of the permit, unless an extension of time thereon is granted by the director of public works. If all of the construction and/or repair work of any sidewalk and/or driveway is not completed at the expiration of the time allowed by the permit appertaining thereto, and in accordance with the terms of this chapter, the director of public works may notify the contractor to complete the work within two days, and if no so completed, the director of public works is authorized to have the same done at the expense of the contractor, and his guarantee deposit, or as much thereof as may be necessary, shall be applied in payment therefor. Such work must be in accordance with such specifications as may be adopted by the City of Richmond, from time to time, for the construction and/or repair of sidewalks, driveways, curbs and/or gutters.

12.36.100 - Driveway defined—Approved width.

A "driveway" is defined as any approach leading to or from a street which passes over or upon the curbing, parking, or sidewalk area, for the purpose of a vehicular approach. Such driveway width shall not be less than twelve feet or more than twenty feet at the curblines except that with the approval of the director of public works, such driveway may be constructed to a greater width.

12.36.110 - Elimination of abandoned driveway—Authority of director of public works.

The director of public works shall have the power and authority to determine that the use for which a driveway was constructed has been abandoned and give written notice requiring that, at the owner's expense, the curb, parkway and sidewalk shall be restored to its original condition, or that a curb be constructed if none previously existed and that the parkway and sidewalk be constructed to established grade.

12.36.120 - Same—Notice.

Such notice, as required in Section 12.36.110, shall particularly specify what work is required to be done, how the same is to be accomplished, and what materials shall be used. The notice shall be given personally by service upon the owner or person in possession of the property facing such driveway, or by placing such notice in the United States mail in a sealed envelope addressed to the person in possession of such property, or to the owner thereof, addressed to his last known address as the same appears on the last equalized assessment rolls of the City of Richmond, and when no address so appears, to general delivery, City of Richmond, with postage prepaid.

12.36.130 - Same—Proceedings to assess costs.

If such work is not commenced within two weeks after such notice is given as aforesaid and diligently without interruption prosecuted to completion, the director of public works shall proceed to cause such work to be done in the manner and pursuant to the provisions of this chapter.

12.36.140 - Temporary obstructions.

The permit granted pursuant to this chapter shall carry with it the right to place, or cause to be placed, upon the street adjacent to the place where the construction, alteration or repair work is to be performed, such materials or equipment as may be necessary for use in performing such work, provided, however, that such materials and equipment shall not occupy more than one-third of the roadway in front of the construction work, and shall be placed thereon subject to the direction and approval of the director of public works. In no event shall the equipment or materials be placed within five feet of any railroad track. All materials, debris, and equipment shall be so placed as not to obstruct any gutterway, and shall be so cared for as to prevent material from being blown or otherwise carried into any gutterway, or any catch basin, or any portion of the street other than that lawfully occupied by such obstruction. No material or other obstruction shall be placed within fifteen feet of fire hydrants, which must remain at all times readily accessible to the fire department.

The permit shall prescribe the date when work shall begin, and the time of occupancy of the street, provided, however, that the director of public works may order the materials, equipment and debris, or any portion thereof, to be removed within three days after written notice, and in the event the same is not removed within the time prescribed by the director of public works, or in the permit, as the case may be, the director of public works may cause the same to be removed and charge the costs thereof against the guarantee deposit. The placing of materials and equipment upon the street for the purpose of such construction work and the removal thereof shall be held to be part of such construction work. In the construction and/or repair of sidewalks, driveways, curbs and/or gutters, all rejected and refuse materials shall be removed immediately and all surplus materials shall be removed from the site within two days after completion of the work.

12.36.150 - Same—Public safety.

Whenever the construction or repair of sidewalks, driveways, curbs and/or gutters, or other improvement contracts or undertakings require the temporary occupancy of any portion of a public street or a public sidewalk and a permit has been granted for such occupancy pursuant to the provisions of this chapter, such permit and such occupancy shall be subject to the provision that permittee furnish and maintain such facilities as fences, barriers, "street closed" signs, lights and watchmen as may be necessary to provide adequate protection and prevention of avoidable accidents to the public.

Where such facilities or any of them are not provided or are out of service and an emergency exists that necessitates protective measures, the director of public works, or his representative, may provide such facilities during the emergency and the cost thereof shall be paid by the permittee or deducted from any deposit made with the City of Richmond as a condition to the granting of such permit.

The director of public works, or his representative, before taking the above-mentioned emergency action, shall take all steps reasonable under the circumstances to notify the permittee, or his known representative, of the existing conditions and allow such permittee to care for the same, provided he acts promptly and expeditiously.

12.36.160 - Removal of obstructions.

Every owner of real property in the City of Richmond shall keep the entire width of the sidewalks in front of such property from curb to lot line, free and clear of all weeds, rubbish, debris, or other obstructions, excepting obstructions permitted by law, which from any cause whatever shall have accumulated or may accumulate upon the sidewalk above the established grade of the same.

The director of public works may order the weeds, rubbish, debris, obstructions or materials to be removed within two weeks after written notice is given, and in the event same is not removed within the time prescribed by the director of public works, the director of public works may cause the same to be removed and the cost of the same shall be a lien on the property.

12.36.161 - Parking strip.

It is unlawful to place loose rock, decorative stones or pebbles, bark, asphalt or any other surfacing not specified hereafter in any strip of land used and maintained for parking between any property line and street. It is lawful to pave with concrete, brick, or exposed aggregate concrete in such a parking strip by first obtaining a permit from the director of public works.

In any of the above-mentioned situations, the director of public works may require that planting areas be left in the parking strip for the planting of street trees and may require the planting of such trees as a condition of such permit.

(Added by Ordinance No. 4-70 N.S.)

12.36.170 - Schedule of fees.

The applicant shall pay to the City of Richmond in the office of the director of public works such fees as may be established from time to time by resolution of the council of the City of Richmond in the following categories:

- (a) Permit Fee. A separate application and permit fee is required for each and every site.
- (b) Inspection Fee. Based on the total area of sidewalk, driveway and gutter and the linear feet of curb, as herein provided.
- (c) Engineering Services. When engineering services are necessary for the proper construction of improvements, such services shall be furnished by the director of public works and fees shall be charged therefor.
- (d) Guarantee Deposit Fee. A deposit fee to guarantee contractor's work from any failure or breakage for a twelve-month period.

(Amended by Ordinance No. 58-79 N.S.)

12.36.180 - Incorporation of Chapter 22, Improvement Act of 1911.

The provisions of Chapter 22 of Part 3, Division 7, Streets and Highways Code of the State of California (cited as the "Improvement Act of 1911") are hereby expressly referred to and by such reference are made a part of this chapter.

12.36.190 - Incorporation of Chapter 27, Improvement Act of 1911.

The provisions of Chapter 27 of Part 3, Division 7, Streets and Highways Code of the State of California (cited as the "Improvement Act of 1911") are hereby expressly referred to and by such reference are made a part of this chapter.

(Source: Ordinance No. 1804)

CITY OF RICHMOND STANDARD – RICHMOND MUNICIPAL CODE

Chapter 12.44 - EXCAVATION, GRADING AND EARTHWORK CONSTRUCTION*

Sections:

12.44.010 - General provisions.

- (a) Purpose and Intent. The primary purposes of this chapter are to protect life, limb and property, to promote and enhance the general public welfare and a superior community environment, and insofar as it is economically feasible, to ensure the maximum possible preservation of the natural scenic character of major portions of the City, by establishing minimum standards and requirements relating to land grading, excavations and fills, and procedures by which these standards and requirements may be enforced. It is intended that this chapter be administered with the foregoing purposes in mind and with a view to:
- (1) Ensuring that future development of lands, particularly in the hillside areas of the City, occurs in the manner most compatible with surrounding areas and so as to have the least adverse effect upon other persons or lands, or upon the general public;
 - (2) Ensuring that soil will not be stripped and removed from lands within the City, leaving them barren, unsightly and susceptible to erosion, subsidence and faulty drainage;
 - (3) Ensuring the regulation of grading private property in order to control erosion, control sedimentation and to protect the water quality of water courses, waterbodies and wetlands;
 - (4) Encouraging the planning, design and development of building sites in such fashion as to provide the maximum in safety and human enjoyment, while adapting development to and taking advantage of the best use of the natural terrain;
 - (5) Encouraging and directing special attention toward retaining and protecting, insofar as practical, the natural planting and a maximum number of existing trees.
- (b) Scope.
- (1) This chapter sets forth rules and regulations to control excavation, grading, and earthwork construction, including fills or embankments; establishes the administrative procedure for issuance of permits; and provides for approval of plans and inspection of grading construction.
 - (2) The provisions of this chapter are supplementary and in addition to the zoning and subdivision regulations of the City. The provisions of this chapter shall be read and construed in connection with and as an integrated part of the zoning and subdivision chapters and the patterns of land development control established thereby.
 - (3) In the event of conflict between this chapter and Chapter 33 of the most recently adopted Uniform Building Code entitled "Excavation and Grading," this chapter shall take precedence.
- (c) Actions Prohibited. It shall be unlawful for any person to:
- (1) Perform any work within the scope of this chapter without a permit from the Building Official.
 - (2) Grade in such a manner so as to:
 - (A) Cause erosion or sedimentation on other property or on public streets;

- (B) Obstruct or otherwise interfere with drainage, or deposit sediment in natural or artificial drainage facilities; or
- (C) Construct or alter drainage facilities or alter drainage courses without first obtaining a grading permit pursuant to Section 12.44.030(c) of this chapter.
- (d) Administration. The Building Official, or the Building Official's designee, is hereby designated responsible for the administration of this chapter.
- (e) Title. This chapter shall be known as the "City of Richmond Grading Ordinance."

12.44.020 - Definitions.

- (a) Definitional Preamble. For the purpose of this chapter, unless it is plainly evident from the context that a different meaning is intended, certain words, terms and phrases used herein are defined as set out in this section.

"Applicant" means any person, partnership, corporation, groups of persons or agency requesting permission to engage in any grading activity. Upon issuance of permit, the applicant is the designated permittee.

"Bedrock" means a relatively solid, structured material in place either at the ground surface or beneath surficial deposits of soil.

"Bench" means a step terrace, or flat land area constructed in the face of a cut or fill slope for maintenance, access, and drainage purposes.

"Borrow" means earth material acquired from an off site location for use in grading on a site.

"Building pad" means that area of a lot, parcel or site which will be occupied by the building structure, and includes any other structure or improvement attached, adjoining or adjacent thereto.

"California Storm Water Best Management Practices Hand Books" or "Hand Book" means the latest published editions of the three manuals entitled Industrial/Commercial, Construction, and Municipals published by the State of California.

"Civil engineer" means an engineer licensed by the State of California to engage in the practice of civil engineering.

"Compaction" means the act of compacting or densifying soil and rock material to a specified density, and the resulting densified state of the material.

"Critically expansive soil and other soil problems" means soil conditions which have the potential to cause damage to improvements, including streets, structures and buildings. Such soils shall be tested by acceptable procedures to provide data suitable for making adequate designs for the improvements.

"Diversion" means a temporary or permanent facility including a channel, ditch, or berm constructed across a sloping land surface to intercept and divert surface runoff in order to control its erosion potential.

"Earth material" means any rock, soil or any combination thereof.

"Engineering geologist" means a geologist licensed by the State of California to engage in the practice of engineering geology.

"Engineering geology" means the application of geological data and principles to engineering problems dealing with naturally occurring rock and soil for the purpose of forming an opinion that geological factors are recognized and adequately interpreted in engineering practice.

"Erosion" means the wearing away, detachment and movement of the ground surface by wind, water, ice or gravity.

"Erosion and Sediment Control Manual" means the latest edition entitled, "Manual of Standards for Erosion and Sediment Control Measures," published by the Association of Bay Area Governments (ABAG).

"Excavation" means any act by which earth material is cut into, dug, quarried, uncovered, removed, displaced or relocated and shall include the conditions resulting therefrom.

"Fill" means a deposit of earth material placed by artificial means and shall include the condition resulting therefrom.

"Final Erosion and Sediment Control Plan" means a plan that depicts the permanent erosion control measures designed for a completed project.

"Geological report" means a report prepared by an engineering geologist, based on a study and investigation of the site by an engineering geologist, including such geological structures and characteristics as fault line, fault creep, and landslide, and shall include recommendations for the execution, testing, and control of all grading operations proposed.

"Geotechnical engineer" means a civil engineer licensed by the State of California to engage in the practice of civil engineering who is experienced in and is engaged in professional practice in the field of geotechnical engineering.

"Geotechnical engineering" means the application of the principles of soil mechanics in the investigation, evaluation, and design of civil works involving the use of earth materials and the inspection and testing of the construction thereof.

"Geotechnical and geological reconnaissance report" means a report as described in Section 12.44.030(g).

"Grade" means the vertical locations of the ground surface.

(1) "Existing or natural grade" means the grade prior to disturbance.

(2) "Rough grade" means the stage at which the grade approximately conforms to the approved plan.

(3) "Finished grade" means the final grade of the site which conforms to the approved plan.

"Grading" means any excavation, stripping, cutting, filling, stockpiling, clearing and grubbing, or any combination thereof which alters land or vegetation.

"Hillside site" means a site having an average slope of fifteen percent (15%) or greater.

"Interim Erosion and Sediment Control Plan" means a plan that depicts a set of erosion control measures designed for a project in an active or passive construction mode between October 1st and April 15th. An active construction project is a site where improvement progress is made within the rainy season. A passive project is a site which is not disturbed during the rainy season, with the exception of erosion control maintenance.

"Key" means a trench or step cut into natural ground to hold fill on an existing slope.

"Mulching" means the application of plant residue or other suitable materials to the land surface to conserve moisture, hold soil in place, and aid in establishing plant growth.

Private Storm Drain Facility Easement. This "easement" means the perpetual maintenance obligations incurred by an owner of a subdivided (improved) parcel containing storm drain facilities installed by permittee within parcel.

"Quarry" means any premises or site from which any rock, sand, gravel, stone, earth, soil, or mineral is removed or excavated for the purpose of disposition away from the immediate premises, whether such disposition is immediate or in the future; excepting excavation necessary for the construction of a building

or structure on the site of the excavation for which valid permits have been issued, and excepting excavation which is all or part of a grading operation to change the contours of the land in conformance with a plan approved by the Building Official for which a grading permit has been issued.

"Rainy season" means the period of time between October 1st and the following April 15th.

"Runoff" means the surface flow of water.

"Sedimentation" means the process by which mineral, organic matter or soil is removed from its site of origin, transported, and then deposited by water, wind, or gravity.

"Sediment basin" means a reservoir which retards flow sufficiently to cause or allow deposition of transported sediment.

"Site" means any lot or parcel of land or contiguous combination where grading is to be performed or permitted.

"Site Grading Plan" (or "Grading Plan") means a plan as required by Section 12.44.030(d).

"Slope" means an inclined ground surface the inclination of which can be expressed as either a ratio of horizontal distance to vertical distance or the ratio of vertical distance to horizontal (100-foot increment) expressed as a percentage.

"Soil" means earth material of whatever origin that overlies bedrock.

"Stockpile" means a supply of earth, rock, gravel, sand, or other similar material temporarily accumulated and stored prior to final disposition.

"Terrace" means a relatively level step of flat area constructed in the face of the graded slope surface for drainage and maintenance purposes.

"Watercourse" means a drainage channel or natural creek carrying water for a substantial part of the year.

12.44.030 - Permits, reports, fees and surety.

(a) Grading Permit Required. Except as otherwise provided in Section 12.44.030(b), no person shall do any grading without first obtaining a grading permit from the Building Official for any of the following activities:

- (1) The excavation or removal of earth or rock from the surface layers of the ground;
- (2) The movement of earth around, along, over, or on the surface of the ground;
- (3) The deposition, placement, or compaction of earth materials for the construction of embankments;
- (4) The stockpiling of earth materials or importing of borrow from off-site locations. A permit shall be required from the jurisdiction which has authority over the borrow site;
- (5) The clearing of vegetation preparatory to a grading operation. A separate permit shall be required for each site, unless the sites are contiguous and the entire area is included in the plans accompanying the application. One permit may cover both an excavation clearing and a fill on the same site.

(b) Exception to Permit Requirement. A grading permit is not required for the following:

- (1) An excavation which:
 - (A) Is less than five (5) feet in depth below natural grade and adequately supported by a retaining structure designed in accordance with the Uniform Building Code, or

- (B) Does not create a cut slope greater than seven (7) feet in height, or steeper than two (2) horizontal to one (1) vertical, or
 - (C) Does not exceed fifty (50) cubic yards;
- (2) A fill not intended to support structures and which does not obstruct a drainage course or alter existing drainage patterns if:
 - (A) Such fill is placed on natural grade that has a slope not steeper than five (5) horizontal to one (1) vertical, or
 - (B) Is less than three (3) feet in depth at its deepest point, measured vertically upward from natural grade to the surface of the fill, or
 - (C) Does not exceed fifty (50) cubic yards;
 - (3) Minor land leveling for agricultural farming, if the average ground elevation is not changed more than three (3) feet;
 - (4) Cemetery graves;
 - (5) An excavation below finished grade for basements and footings of structures authorized by a valid building permit or trench excavations for the purpose of installing underground utilities, if to be backfilled to natural grade;
 - (6) Grading in refuse disposal areas and sanitary landfills, mining, quarrying, processing or stockpiling of rock, sand, gravel, aggregate, or clay, for which a use permit has been granted by the City, provided that such operations do not affect the lateral support or increase the stresses in, or pressure upon, any adjacent or contiguous property and are consistent with the grading practices set forth herein, and where the work does not block or divert any natural drainage way or increase runoff or sedimentation onto any adjacent or contiguous property;
 - (7) Improvement of watercourses and construction of drainage, irrigation, and domestic water supply systems and facilities performed under the supervision of the Flood Control District, an agency of the Federal or State government, a water or sanitation district, or an irrigation or reclamation district, or the City;
 - (8) The construction, repair and maintenance of levees for river and local drainage control performed by a governmental agency;
 - (9) Emergency work, as authorized by the Building Official, necessary to protect life, limb or property, or to maintain the safety, use or stability of a public way or drainage way;
 - (10) Excavation for installation of underground storage tanks where the capacity of the tanks does not exceed twenty thousand (20,000) gallons;
 - (11) Grading in an isolated, self-contained area if the Building Official determines that no danger to private or public property is likely to result from the grading operations;
 - (12) The structural section of subdivision streets in tracts for which subdivision improvement plans have been reviewed by the City Engineer and the work is being inspected by that department;
 - (13) Temporary local borrow pits for road materials and topsoil for landscaping situated within a larger ownership being subdivided into smaller tracts, if the material is being used entirely within the tracts being subdivided, and if the excavation does not endanger properties under other ownerships or create a public nuisance or safety hazard as determined by the Building Official. The land shall be graded to comply with this chapter on cessation of excavation within the pit areas;

- (14) Temporary stockpiles of topsoil materials required for landscaping lots being graded in the immediate area for building purposes if the stockpiles are not placed within a public right-of-way, do not obstruct drainage ways, are not subject to erosion which will cause silting problems in drainage ways, do not endanger other properties, and do not create a public nuisance or safety hazard, as determined by the Building Official. The land shall be graded to comply with this chapter after removal of stockpiles;
 - (15) Fire trails, and access roads to public utility, gas and electric transmission lines;
 - (16) Clearing vegetation when all of the following conditions are met:
 - (A) The slope of the ground is ten percent (10%) or less,
 - (B) The area to be cleared is one (1) acre or less,
 - (C) Land disturbance is at least within one hundred (100) feet from the centerline of the watercourse or at least one hundred (100) feet from the water line of a water body;
 - (17) Subsections 12.44.030(b)(1) through (b)(16) notwithstanding, where the excavation or fill occurs on slopes with a natural slope of 3:1 and the height of such slope is seven feet or greater, no exception shall be provided unless determined by the Building Official.
- (c) Application for Permit.
- (1) An application for a grading permit shall be in writing and filed with the Building Official on forms provided for such purpose. The application shall be signed by the owner of the property where the work is to be performed or by his duly authorized agent, provided that an agent's authority must be shown in writing. The application shall contain the following information:
 - (A) Description of the site by lot, block and tract designation, and by a street address or similar description sufficient to readily identify the site;
 - (B) The name and address of the owner of the site, the person who is to perform the work, and the geotechnical and civil engineer if such work is to be performed as supervised grading;
 - (C) The estimated cost of performing the work;
 - (D) Such other information as may be required by the Building Official.
 - (2) Each application shall be accompanied by four (4) sets of plans, specifications and calculations that meet the requirements set forth in Section 12.44.030(d).
 - (3) Each application shall include the name, address and phone number of the civil engineer, geotechnical engineer and/or engineering geologist will be employed to give technical supervision or make inspections of the work, whenever approval of the plans and issuance of the permit is based upon the condition that such professional person be so employed.
 - (4) Each application shall authorize the Building Official to conduct a field investigation and site evaluation of a lot or parcel. The investigation shall determine what additional information, engineering data or plans (including NOI (notice of intent), if applicable) will be required to be submitted with the application for grading and/or building permits and under what conditions the permits would be issued, prior to permit approval for a grading and/or building permit.
- (d) Grading Plans and Specifications. The plans shall be prepared, stamped and signed by a civil engineer and the plans and specifications shall contain the following:
- (1) A vicinity sketch or other means of adequately indicating the site location;
 - (2) Boundary lines of the site;
 - (3) Each lot or parcel of land into which the site is proposed to be divided;

- (4) The location of any existing buildings or structures on the property where the work is to be performed, and the location of any buildings or structures on adjacent land which may be affected by the proposed work;
 - (5) Accurate contours showing the topography of the existing ground to two hundred (200) feet beyond project parcel boundary;
 - (6) All of the proposed uses of the site, and if the site is to be divided, the proposed use of each lot or parcel of land;
 - (7) Elevations, location, extent and slope of all proposed grading shown by contours, cross-sections or other means and location of any rock disposal areas, buttress fills or other special features to be included in the work;
 - (8) Detailed plans of all drainage systems and facilities, walls, cribbing, or other erosion protection devices to be constructed in connection with, or as a part of the proposed work, together with a map showing the drainage area and estimated runoff of the area served by any drainage systems of facilities;
 - (9) A Final Erosion and Sediment Control Plan and/or an Interim Erosion and Sediment Control Plan (Section 12.44.030(e)), as required by the Building Official;
 - (10) The extent and method of the cutting of trees and the clearing of vegetation, the disposal of same, and the measures to be taken for the protection of undisturbed trees and vegetation. All existing trees on or overhanging the site shall be indicated;
 - (11) The grading plan must be signed by a registered civil engineer and must be prepared by or under said civil engineer's direction;
 - (12) An estimate of the cost of the work described and delineated on the grading plan;
 - (13) A statement of the quantities of material to be excavated and/or filled and the amount of such material to be imported to, or exported from, the site;
 - (14) A statement of the estimated starting and completion dates for work covered by the permit;
 - (15) Routes of travel to be used;
 - (16) Hours and days of work;
 - (17) The signature of the geotechnical engineer whose report was used in the design of the grading;
 - (18) Such other information as the Building Official deems necessary to show conformance of the proposed grading with the requirements of this chapter and other related ordinances.
- (e) Final and Interim Erosion and Sediment Control Plan.
- (1) A Final Erosion and Sediment Control Plan, prepared by a registered civil engineer, shall be submitted unless all of the following conditions are met:
 - (A) The area of land disturbed is less than one-half (½) acre;
 - (B) Natural and finished slopes are less than ten percent (10%);
 - (C) Volume of the grading operation is less than fifty (50) cubic yards;
 - (D) The temporary storage of any soil is less than one hundred fifty (150) cubic yards;
 - (E) The grading operation is not within one hundred (100) feet of the centerline of any watercourse, within one hundred (100) feet of the water line of any water body or the Bay (high tide) or manmade drainage structure;

- (F) The proposed grading does not pose a threat to adjacent or downstream properties as determined by the Building Official;
 - (G) The proposed grading does not obstruct water courses;
 - (H) The proposed grading is deemed to have no significant environmental impact as determined pursuant to the provisions of the California Environmental Quality Act, as amended, and the regulations promulgated by the California Resources Agency and the Richmond City Council to implement such Act.
- (2) The Final Erosion and Sediment Control Plan shall through the use of permanent control features minimize soil erosion and maximize sediment interception from the completed project site and shall also provide for the control of runoff from the site.
 - (3) The Final and Interim Erosion and Sediment Control Plans shall contain the following information:
 - (A) A description and delineation of the vegetative measures to be taken to minimize erosion and sedimentation. (The ultimate landscape plan for the site is deemed to satisfy this criteria;)
 - (B) A description and delineation of the temporary and permanent measures to be taken to protect manufactured or disturbed slopes from erosion by mechanical means such as mulches, diversion dikes, etc.;
 - (C) The delineation of the drainage control measures to be taken which shall include surface runoff and sediment yield calculations;
 - (D) The extent and method of the cutting of trees and the clearing of vegetation, the disposal of same, and the measures to be taken for the protection of undisturbed trees and vegetation;
 - (E) The methods to be used for the disposal of excess materials;
 - (F) The methods to be used for the control of dust;
 - (G) A description and delineation of the temporary and permanent measures to be taken to retain sediment on the site;
 - (H) A description of the measures to be taken to maintain the devices shown on the plan during grading operations and construction on the site;
 - (I) The extent of disturbed ground that will exist, what streets will be paved, and what drainage devices will be installed prior to the start of each rainy season;
 - (J) Any other information required by the Building Official;
 - (K) A schedule for installation and maintenance of erosion and sediment control measures.
 - (4) The Final and Interim Erosion and Sedimentation Control Plans are to be prepared in accordance with the latest editions of either the "Manual of Standards for Erosion and Sediment Control Measures" by ABAG or provisions of the "California Storm Water Best Management Practices Hand Books," for both temporary and permanent erosion control measures. These plans shall be prepared by a registered civil engineer. The plans shall include the names and telephone numbers of twenty-four (24) hour standby work crews during the October 1st to April 15th rainy season.
 - (5) Minor work such as trenching or maintenance which meets the intent of the aforementioned "Manual of Standards for Erosion and Sediment Control Measures" may be excluded from the requirement of preparing the Erosion and Sediment Control Plan provided that the owner, contractor, or developer first obtains a written waiver from the Building Official.

- (6) An Interim Erosion and Sediment Control Plan is required prior to each rainy season during construction for a staged project. The Building Official will determine by July 15th if an interim plan will be necessary and on what stage of project completion the plan shall be based.
- (7) An estimate of the cost of the work described and delineated on the Final and Interim Erosion and Sediment Control Plans and the permit must be submitted in a form which is acceptable to the Building Official. This plan when required is considered an integral part of the project grading plan, and fees for plan check and inspection shall be paid as set forth in Section 12.44.030(j).
- (8) The applicant shall submit tentative start and completion grading dates with the grading permit application. Prior to issuance of a grading permit, the grading contractor shall review the proposed start and completion dates and supply the Building Official with a schedule including a breakdown of equipment and personnel that will be used to complete the job within the time frame submitted. Issuance of permits for grading to be performed during the following periods will require the following:
 - (A) April 15th to August 15th. If grading is initiated during this period and can be completed before October 1st, no Interim Erosion and Sediment Control Plan needs to be submitted with the application. On or before July 15th, the Building Official shall evaluate all projects for compliance with a completion date of September 30th. If the Building Official determines that the project cannot be completed by September 30th, the applicant shall prepare an Interim Erosion and Sediment Control Plan to be submitted by August 15th.
 - (B) August 16th to September 30th. The Building Official shall determine if the grading can be completed during this period based on the grading plans and submission of schedule. If it is determined that the project cannot be completed, the applicant shall prepare as part of the grading plan application an Interim Erosion and Sediment Control Plan. The grading plan shall be designed so that provision of the Interim Erosion and Sediment Control Plan can be implemented fully by September 30th.
 - (C) October 1st to April 14th. During this period, all grading plans submitted for permits which cannot be exempted under subsection (e)(1) of this section shall include an Interim Erosion and Sediment Control Plan as part of their grading plan which reflects the active construction mode anticipated for the site per Section 12.44.040(f).
- (f) Geological Report. The Building Official may require a geological report based on the most recent grading plan proposal. The engineering geological report shall include an adequate description of the geology of the site and conclusions and recommendations regarding the effect of geological conditions on the proposed development.
- (g) Geotechnical Report. The Building Official may require a geotechnical report based on the proposed grading plan. Such report shall be prepared by a geotechnical engineer based upon adequate test borings or excavations. The report shall indicate the presence of critically expansive soils or other soils problems, which if not corrected could lead to defects in structures, buildings or other improvements; and, when it so indicates, the report shall further report on an investigation of each lot of the development including recommended corrective action which is likely to prevent such defects or damage to each building, structure or improvement to be constructed. The geotechnical report shall contain:
 - (1) Reports on the suitability of the earth material for construction of stable embankments and excavation slopes, including those necessary for any artificial or natural drainage channels;
 - (2) Recommendations for construction procedures to obtain required stability;
 - (3) Maximum design velocities for any natural or artificial drainage channel; and

- (4) Any other recommendations concerning slides, unstable soil condition, springs and seepage conditions, or drainage facilities to enable proper development of the site.
- (h) Review of Reports. All reports shall be subject to review by the Building Official. Supplemental reports and data may be required as deemed necessary. Recommendations included in the reports and approved by the Building Official shall be incorporated in the development plan or specifications.

(i) Issuance or Denial of Permit, Conditions and Limitation.

- (1) Issuance. Upon receiving an application for grading permit, together with all of the submittals required by Sections 12.44.030(c), (d) and (e) and 12.44.040(e) and (f), the deposit of fees as required by Section 12.44.030(j), and the posting of surety as required by Section 12.44.030(l), the Building Official shall examine the application and related documents, and, if satisfied that the application meets all requirements of this chapter and of other applicable laws, ordinances, rules, and regulations, the Building Official shall issue the permit. The application for a permit shall contain, but shall not be limited to the following provisions:
- (A) A provision which requires that pre-construction conference shall be scheduled with all principal decision makers present to discuss and coordinate various aspects of the grading project;
 - (B) A provision which states that the grading shall not be excessive and that the grading shall not go beyond that necessary for the permitted use of the site;
 - (C) A provision which provides that the slopes can be effectively protected against erosion and slippage;
 - (D) A provision which requires that the finish contours be relatively natural and that the finish contours not distort the natural contours;
 - (E) A provision which requires that hillside sites be suitable for development in the manner proposed;
 - (F) A provision which mandates that the removal of natural vegetation not be excessive and that the vegetation removal be done in a manner which will minimize erosion;
 - (G) A provision which requires that drainage not be constructed or directed in a way which damages other property or increases erosion.

The permit that is issued pursuant to this section shall be issued only to the owner or his agent. The permit shall be kept on site, securely displayed in a conspicuous location.

(2) Grounds for Permit Denial.

- (A) Hazardous Grading. The Building Official shall not issue a permit where the determination is made that the work as proposed by the applicant has the potential to endanger any public or private property through grading or removal of vegetation or result in the deposition of debris on any public or private way or interfere with any existing drainage course or alter water quality. If it can be shown to the satisfaction of the Building Official that the hazard can be essentially eliminated by the construction of retaining structures, buttress fills, or drainage devices, or by other means, the Building Official may issue the permit with the condition that such work be performed.
- (B) Geological or Flood Hazard. If, in the opinion of the Building Official, the land area for which grading is proposed is subject to geological or flood hazard to the extent that no reasonable amount of corrective work can eliminate or sufficiently reduce the hazard to human life or property, the grading permit shall be denied.
- (C) Noncompliance With Land Use Conditions. The Building Official shall not issue a grading permit for work that does not or has no reasonable expectation to comply with conditions of approval imposed on a project, the provisions of this Code, or any condition imposed by the approving authority on approval of the use.
- (D) Existing Building Code or Zoning Ordinance Violations. The Building Official shall not issue a grading permit if any building code or zoning ordinance violation exists on the site.

- (3) Limitations of Permit. The issuance of a permit under this chapter shall constitute an authorization to do only that work which is described or illustrated on the application for the permit or on the site plans and specifications approved by the Building Official.
- (A) Compliance with Plans and Requirements. All permits issued hereunder shall be presumed to include the provision that the applicant and their agents, contractors and employees shall carry out the proposed work in accordance with the approved plans and specifications and in compliance with all the requirements of this chapter.
 - (B) Time Limits. The permittee shall fully perform and complete all of the work required to be done pursuant to the grading permit within the time limit specified. If no limit is specified, the permittee shall complete the work within one hundred eighty (180) days after the date of the issuance of the grading permit.

If unable to complete the work within the specified time, the permittee shall request, prior to the expiration of the permit, in writing to the Building Official for an extension of time, setting forth the reasons for the requested extension. If, in the opinion of the Building Official, such an extension is warranted, the Building Official may grant additional time for the completion of the work for which additional fees may be applicable. Denial of an extension of time shall not preclude the right of the permittee to apply for a new permit for the remaining balance of the work. Written consent of the surety to any extension of time must be furnished before the approval of the extension becomes effective, unless the security consists of a cash deposit.

- (C) Liability and Hold Harmless. Neither the issuance of a permit under the provisions of this chapter, nor the compliance with the provisions thereof or with any conditions imposed in the permit issued hereunder, shall relieve any person from responsibility for injury to people or damage to property. The permittee shall execute a hold harmless clause on the permit which shall read as follows:

The permittee, for themselves, their contractors, and employees, agrees to save, indemnify, defend, and hold harmless the City of Richmond and its officers, employees, and agents from all liabilities and claims for damages by reason of injury or death to any person or persons or damage to property from any cause whatsoever while in, upon, or in any way connected with the work covered by this grading permit.

- (D) Jurisdiction of Other Agencies. Permits issued under the requirements of this chapter shall not relieve the permittee of any requirements or responsibilities for fully conforming to any other requirements for the work to be done, including but not limited to securing permits and licenses established by any law, ordinance, rule, or regulation of the City of Richmond, or employee thereof, or of any other Public Agency having jurisdiction over such work.
- (4) Conditions of Permit. In granting any permit under this chapter, the Building Official and the Planning Director shall impose such conditions thereon as are reasonably necessary to prevent the proposed operations from being conducted in such a manner as to constitute or create a nuisance or a hazard to life or property. Such conditions may include, but shall not be limited to:
- (A) Improvement of any existing grading to bring it up to the standards of this chapter;
 - (B) Requirements for fencing of excavations or fills which otherwise would be hazardous and for fencing around drip lines of trees;
 - (C) Screen planting, landscaping or other treatment to maintain good appearance of graded area and reduce the detrimental impact on adjacent properties or the community;
 - (D) Completion of the work within a period approved by the Building Official;
 - (E) Cleaning up the area and planting in accordance with approved plan;

- (F) Designation of the area in which work may be done;
 - (G) Designation of the slope or the grade and elevation of the excavation or fill;
 - (H) Reasonable provisions for controlling excessive dust;
 - (I) Normal hours of operations established by the City or as modified in the permit;
 - (J) Safety precautions to guide pedestrian and vehicular traffic in, around, and by the operation;
 - (K) Posting of good, sufficient and separate surety to assure compliance with the conditions;
 - (L) The route and time of travel over public streets so as to cause the least interference with general traffic and to cause the least damage to public streets. A separate surety may be required if, in the estimation of City Engineer, there is the possibility of damage to public streets due to excessive loadings or truck trips;
 - (M) The removal of rock, earth, or other materials that may be deposited on public streets by reason of said grading operations;
 - (N) The payment to the City of the cost of repairing damage to or cleaning of public streets caused by trucking operations in connection with said grading operations;
 - (O) The installation of suitable fencing, barricades, and lighting surrounding the grading operations;
 - (P) Conformance at all times with the approved Interim and Final Erosion and Sediment Control Plans;
 - (Q) A licensed land surveyor or registered civil engineer authorized to do surveying must delineate the boundary lines of the site;
 - (R) The disposal site for any material removed from the grading site must be approved by the Building Official if located within the City. If the disposal site is not located within the City, then permittee shall provide an approved grading permit from the jurisdiction where the receiving disposal site is located;
 - (S) The extent of unprotected slopes allowed at any one time and the time such slopes are allowed to remain unprotected;
 - (T) Other conditions deemed necessary by the Building Official and based on accepted engineering practices.
- (j) Fees. Fees shall be collected by the Building Official as established by a resolution of the City Council.
 - (k) Refunds.
 - (1) Filing fees, permit transfer fees, penalty fees and site investigation fees are not refundable.
 - (2) In cases of a reduction of planned work, the approval of an amended permit by the Building Official and satisfactory completion of the work covered by an amended permit, the permittee may apply to the Building Official within thirty (30) days after issuance of the certificate of completion for a refund of a portion of the permit fee based on the revised cost of the work in the amended permit.
 - (l) Surety.
 - (1) Surety Required. If the Building Official determines that the nature of the proposed work is such that, if left incomplete, it will interfere with any natural or artificial drainage, or will endanger persons or public or private property, or will constitute a nuisance or if he determines that the

proposed work involves the removal or deposition of more than fifty (50) cubic yards of material, the applicant for the grading permit shall post with the Building Official a surety executed by the applicant and secured, at the option of applicant, by

- (A) A corporate surety bond executed by a surety company authorized to do business in the State of California; or
 - (B) By deposit with the City of Richmond of cash money or its equivalent; or
 - (C) By deposit with the City of Richmond of an instrument of credit from a financial institution subject to regulation by the State of California or the Federal government pledging that the funds necessary to meet the performance are on deposit and guaranteed for payment upon demand and agreeing that the funds designated by the instrument shall be trust funds for the purposes set forth in the instrument. The form of the bond and the security shall be subject to approval by the Building Official and the City Attorney.
- (2) Amount of Surety. The amount of the surety shall be based upon the cost of the total number of cubic yards of material moved, plus the cost of all drainage erosion control or other protective devices or work necessary to eliminate geological hazards or to protect persons or public or private property. The amount of surety shall reflect market value to perform subject work or revert site back to original condition.

When the rough grading has been completed in conformance with the requirements of this chapter, the Building Official may, at the Building Official's discretion, consent to a proportionate reduction of the surety to an amount estimated to be adequate to insure completion of the grading work, site development, or planting remaining to be performed. The costs referred to in this section shall be as estimated by the Building Official.

- (3) Conditions of Surety. Among other appropriate provisions, every bond shall include the following conditions to which the principal and surety shall each be bound:
- (A) To comply with all of the provisions of this chapter and all other applicable laws, ordinances, rules, and regulations;
 - (B) To comply with all of the terms and conditions of the permit for excavation or fill to the satisfaction of the Building Official;
 - (C) To complete the work contemplated under the permit within the time limit specified in the permit. (The Building Official may, for sufficient cause, extend the time specified in the permit, but no such extension shall release the surety;)
 - (D) To pay all reasonable costs incurred or expended by the City of Richmond, including but not limited to court costs and attorney's fees, in doing or causing to be done any of the work set forth in the permit, any other work which in the judgment of the Building Official is required to be done as a result of any work or activity done under the permit, or any abatement of any nuisance created by any work or activity done under the permit, or in collecting money or damages in connection with any of the foregoing.
- (4) Term of Surety. The term of the bond shall begin on the date of its posting and shall end on the satisfactory completion of the terms and conditions of the permit. Completion shall be evidenced by a certificate of completion to be issued by the Building Official and filed with the records of the permit. A copy of the certificate shall be furnished to any interested party upon request.
- (5) Notice of Default. Whenever the Building Official finds that a default has occurred in the performance of any term or condition of any permit, he shall give written notice thereof separately to the permit holder and to his surety. Such notice shall state the work or other things necessary to be done in order to cure such default, its estimated cost, if known, and the period of

time deemed reasonably necessary by the Building Official to complete such work, and to do such other things which are necessary to be done in order to cure such default. Such notice shall be served personally or by deposit in the United States mail in a sealed envelope, with postage fully prepaid, addressed to the permit holder and to his surety at the mailing address, or, if there is no mailing address, the business address, shown in the application or in the surety, as the case may be.

- (6) Duty of Surety. Upon service of the notice of default, the surety shall be obligated to have the work done within the time specified in the notice.
- (7) Disposition of Cash Security. If cash money or its equivalent or an instrument of credit has been deposited to secure the bond, and if notice of default has been served upon the permit holder and he has failed to do the work and other things required to be done by the notice within the time specified in the notice, the Building Official may use such deposit in order to have such work and other things done, by contract or other means in the discretion of the Building Official. The balance, if any, shall be returned to the depositor after completion of the work and other things.
- (8) Right of Entry. In the event of any default in the performance of any term or condition of the permit, the surety, if any, or any person employed or engaged on its behalf, or the Building Official or any person employed or engaged on his behalf, shall have the right to go upon the premises to complete the work and do other things required by the permit. It shall be unlawful for any person in any way to hinder, obstruct, or prevent such entry.
- (9) Erosion and Sediment Control Surety. If a grading permit requires the preparation of an Erosion and Sediment Control Plan, the applicant shall secure the performance of the work described and delineated in the plan as follows:
 - (A) The Building Official shall review the Interim and Final Erosion and Sediment Control Plans and estimate to determine the bond amount to cover the Erosion and Sediment Control Plans, their implementation and maintenance. If the approved engineer's estimate of cost of the Erosion and Sediment Control Plans is less than ten thousand dollars (\$10,000), a cash bond in that amount is to be provided to the City. If the approved engineer's estimate of cost of construction of the Erosion and Sediment Control Plans is more than ten thousand dollars (\$10,000), then a cash bond of at least ten thousand dollars (\$10,000) shall be posted with the City to cover the work outlined in the Erosion and Sediment Control Plans. After reviewing the grading plans and the Erosion and Sediment Control Plans, the Building Official shall determine the final amount of the cash bond. If permanent site landscaping is an element of the Final Erosion and Sediment Control Plan, then the value of that improvement may be deducted if a separate landscape surety is being required.
 - (B) When a cash bond amount has been determined, the differences between the cash bond and the total surety requirement shall be provided to the City in the form of bonds or other surety acceptable to the City Attorney. As part of the Erosion and Sediment Control Plan, the applicant shall submit a time schedule outlining specific dates when each element of the plan is proposed to be completed. After the schedule has been agreed to by both the City and the applicant, this schedule shall be the triggering mechanism for the City performing the work in lieu of the applicant's contractor. If the contractor has not or cannot install the Interim and Final Erosion and Sediment Control Plan items by scheduled dates, the City, at its option, can install the items necessary to protect the project site and other property. Such items of work shall be paid for from the applicant's cash deposit. In addition, any items of Erosion and Sediment Control Plan work that have been installed and are not being adequately maintained to protect the site as determined by the Building Official shall be remedied, and any associated cost shall be paid for from the applicant's cash bond. During storm periods, if the applicant's contractor cannot be contacted or cannot perform required

work needed to protect the site as determined by Building Official the City shall cause the work to be performed and any associated costs shall be paid from the applicant's cash bond.

- (C) In accepting the grading permit, the applicant acknowledges the right of the City or its representative to come on to the applicant's property to perform any or all needed work, as previously outlined in this section.
- (D) Notice of Default. Whenever the Building Official finds that a default has occurred in the performance of any term or condition of any permit, the Building Official shall give written notice thereof separately to the permit holder and to the permit holder's surety. Such notice shall state the work necessary to be done in order to cure such default, its estimated cost, if known, and the period of time deemed reasonably necessary by the Building Official to complete such work, and to do such other things which are necessary to be done in order to cure said default. Such notice shall be served personally or by deposit in the United States mail in a sealed envelope, with postage fully prepaid, addressed to the permit holder and to his surety at the mailing address; or, if there is no mailing address, the business address, shown in the application or in the bond, as the case may be.
- (E) If any part of the cash bond needs to be expended by the City to undertake work items outlined in subsection (l)(9)(b) of this section, the associated grading permit is automatically terminated. The applicant shall submit a new grading permit application, a new grading plan with an Erosion and Sediment Control Plan acceptable to the Building Official and provide the appropriate bonds and fees required by the City. There is no guarantee that a new permit will be issued.
- (F) When all grading as shown in the approved grading plans has been completed, and all items of work in the Erosion and Sediment Control Plan have been installed to the satisfaction of the Building Official, the applicant may request exoneration of grading and Final Erosion and Sediment Control Plan bonds. The Building Official shall review all requests for exoneration of grading bonds, but Final Erosion and Sediment Control Plan bonds shall not be considered for exoneration until the site has weathered a storm season from October 1st to April 15th with Final Erosion and Sediment Control Plan elements including permanent landscaping in place. The Building Official can, upon request, make a determination on minor grading projects whether or not the Erosion and Sediment Control Plan bonds need to be held through a storm season.
- (m) Job Plans. When an application is approved and a permit issued, one set of plans and accompanying documents shall be clearly marked as approved and shall be returned to the applicant. This set shall be kept available for reference at the job site during grading and construction. The applicant may furnish additional sets of plans and documents for notation as reviewed for return to the applicant for his use.
- (n) Amendment of Permit.
 - (1) Any changes in the plans, grades, or extent of work shall be submitted to the Building Official for written approval and incorporated into the permit, accompanied by any necessary fees, before any change in the approved work is begun. The Building Official may amend the permit to approve altered plans, or may deny approval of the changes.
 - (2) Failure to obtain prior approval for any change in the work shall be cause for the Building Official to order suspension of all work until approval is obtained, and may result in revocation of the permit if he deems the changes will increase the hazard to adjoining properties or public roads, or otherwise be detrimental to public welfare.
- (o) Transfer of Permit.

- (1) Any transfer of a permit from the permittee to another party is prohibited unless approved by the Building Official.
 - (2) The transferee shall agree to comply with the requirements and conditions of the original permit and to any modification thereof that may be required because of changes in the condition of the site or change in plans since the permit was issued. The transferee shall furnish the required sureties before the transfer of the permit will be approved.
- (p) Suspension and Revocation of Permit.
- (1) Grounds. A permit may be suspended or revoked if the Building Official finds that:
 - (A) Conditions at the site vary appreciably from those shown and stated in the application and development plans;
 - (B) Grading or construction does not conform to the approved plans, grades, Interim or Final Erosion and Sediment Control Plan, or other conditions of the permit;
 - (C) Cessation of work before completion that has left the site in a condition hazardous to the public or to the adjacent properties, and the permittee has not complied with reasonable requirements for completion of the work within the time specified in the permit or an approved extension of time;
 - (D) The permittee does not comply with reasonable requirements to safeguard the workers, the public, or other persons acting in a lawful manner, during grading or construction operations;
 - (E) In transporting materials or in the operation of equipment the applicant causes materials or litter to encroach, obstruct, or be deposited on pavement or in drainage channels within the public right-of-way, or causes unauthorized obstruction or diversion of drainage channels within the site area; or
 - (F) The permittee fails to have a qualified inspector working under the geotechnical engineer on the site during grading or construction, when required, or failure to have the work under proper supervision at all times.
 - (2) Procedure. Upon determination that grounds for revocation or suspension of a grading permit exist, the Building Official may fix a time and place for a hearing on revocation or suspension and shall give written notice thereof separately to the permit holder and to the surety, if any, stating in general terms the grounds for revocation or suspension. Such notice shall be given at least five (5) days before the hearing, and it shall be served personally or by deposit in the United States mail in a sealed envelope, with postage fully prepaid, addressed to the permit holder and to his surety at the mailing address, or, if there is no mailing address, the business address, as shown in the application or in the bond, as the case may be.

Within thirty (30) days of the conclusion of the hearing, the Building Official shall make his findings and decision and file same in his office and shall serve a copy thereof separately upon the permit holder and his surety, if any, in the manner provided above for service of notice of hearing.
 - (3) Exception. If the Building Official determines that emergency conditions exist on the site which constitute a threat to the public health, safety, and welfare, the grading operation in its entirety or portion thereof shall immediately cease.
- (q) Notice to Cease Work.
- (1) Upon notification from the Building Official of the suspension of the permit, the permittee shall cease all work in connection with the permit with the exception of the work necessary to correct

the conditions which caused the suspension of the permit. The permittee shall proceed at once to correct such objectionable or emergency conditions.

- (2) If the permittee fails to correct such objectionable or emergency conditions, the Building Official may cause the work necessary to correct said conditions to be done, and the Building Official may take action against the permittee's surety to cover the cost of performing the work.
- (3) Any permit which has been suspended may be either reinstated or revoked by the Building Official.
- (4) Whenever a permit has been revoked, work shall not commence until a new application has been filed and approved incorporating the necessary revisions required to fulfill the intent of this chapter, and a new permit has been issued.

12.44.040 - Control of work.

- (a) City Inspection. The Building Official and other authorized City representatives shall have the right to enter the site at all times to insure compliance with permit conditions.
- (b) Supervised or Regular Development Work. All work involving a fill intended to support improvements, or grading where the Building Official determines that special conditions or unusual construction hazards exist, shall be performed under the inspection of a civil engineer and/or geotechnical engineer and shall be designated "supervised development work." Work other than supervised development work shall be designated "regular development work."
- (c) Inspection and Reports of Regular Development Work.
 - (1) For regular development work the Building Official or designated representative, upon notification from the permittee or his agent, shall inspect the work at the following stages of the work and shall either approve the portion then completed or shall notify the permittee or their agent of the inspection results.
 - (A) Initial. When the site has been cleared of vegetation and unapproved fill and has been scarified, benched or otherwise prepared and before any fill is placed.
 - (B) Rough. When rough grading has been completed and approximate final elevations have been established; drainage terraces, swales and other drainage devices have been graded and are ready for paving; and berms have been installed at the top of slopes.
 - (C) Final. When work has been completed with all drainage devices, systems and facilities installed and slope planting established.
 - (2) In addition to the inspections specified above, the Building Official may:
 - (A) Make such other inspections as the Building Official deems necessary to determine that the work is being performed in compliance with the requirements of this chapter; and
 - (B) Require investigations and reports by a geotechnical engineer and/or engineering geologist.
- (d) Inspection and Reports for Supervised Development Work. The following inspections and reports shall be required for supervised development work:
 - (1) It shall be the responsibility of the geotechnical engineer and/or civil engineer to inspect the operations and provide qualified full-time inspection to assure compliance of the work with the approved development plans and with the requirements of the Building Official. The geotechnical engineer and/or civil engineer shall certify in writing to the satisfactory completion of each stage of the work specified in Section 12.44.040(c).
 - (2) The geotechnical engineer shall submit compaction data and geotechnical engineering recommendations made during the development operation to the Building Official.
 - (3) The civil engineer shall submit inspection reports regarding drainage facilities, lot drainage and finish grades to the Building Official.
 - (4) The engineering geologist shall submit inspection reports regarding geological conditions to the Building Official.

- (e) Interim Erosion and Sediment Control Inspection.
- (1) Site Observation. Between October 1st and April 15th, an inspector shall visit the site a minimum once a day. A log will be kept indicating the time of inspection, and relevant comments on progress and site conditions. During storm periods, an inspector shall visit the site twice a day including weekends and shall be accompanied by the contractor's superintendent and shall check as a minimum the following items:
 - (A) V-ditches shall be checked for proper operation (i.e., flow, silt build-up, deterioration of banks);
 - (B) Straw bales shall be checked for silt build-up and bales removed or replaced as necessary;
 - (C) Sand bags shall be checked for damage and silt plugged bags replaced as needed;
 - (D) Detention/retention basins shall be checked for damages and silt removed periodically as determined necessary;
 - (E) Overflow spillways shall be checked for proper operation;
 - (F) Filter fabric shall be checked. Plugged and damaged fabric shall be replaced as necessary.
 - (2) The time of inspection, the personnel visiting the site, the condition of the site and the adequacy of the erosion control facilities shall be logged.
 - (3) If corrections need to be made to protect the site, the items of work and time scheduled to perform the work by the contractor shall also be noted.
- (f) Interim and Final Erosion Control Measures. Erosion control measures shall be installed for all rainy season active and passive construction projects. Grading operations may commence in or continue through rainy season, at the discretion of the Building Official, provided that erosion control measures in conformance with approved plans are immediately installed and are kept continuously in place, as the case may be. The only control measures which may be altered are those in direct conflict with daily construction activity, as long as such controls are replaced at the end of construction activity that day or start of storm event. Erosion control measures shall include, but not necessarily be limited to, the following:
- (1) The Erosion and Sediment Control Handbook and California Storm Water Best Management Practices Hand Book shall be used as guides for the design and suitability of erosion and sediment control measures.
 - (2) The faces of cut and fill slopes shall be protected against damage by erosion and the methods utilized for each protection must offer effective erosion control prior to the beginning of, as well as during, the rainy season.
 - (3) Where graded slopes are steeper than three (3) feet horizontal to one (1) foot vertical or are higher than ten (10) feet, they shall be protected with a temporary soil stabilization measure such as jute matting or an equivalent mulch until planting is established.
 - (4) The surface of all cut slopes higher than five (5) feet and all fill slopes higher than three (3) feet shall be permanently protected against damage by erosion by the planting and establishment of protective vegetation.
 - (5) Slopes higher than fifteen (15) feet shall be planted with one shrub per one hundred (100) square feet of slope and one (1) tree per four hundred (400) square feet of slope. Geometric spacing should be avoided. Massing of trees is encouraged. Size and species of plant material shall be subject to review.

- (6) The planting of seeding or vegetation protection must be effective. If the vegetation does not grow and offer proper protection, it must be replanted or reseeded.
 - (7) The maintenance of vegetative protection on graded slopes shall be the responsibility of the permittee and shall be guaranteed until the vegetation is well established as determined by the Building Official or until the maintenance is officially assumed by another party approved by the Building Official.
 - (8) Sediment control facilities shall be operational prior to the beginning of the rainy season and must effectively prevent sediment from being transported downstream.
 - (9) The outlet from any sedimentation basin must be designed to handle 1.5 times the maximum design inflow.
 - (10) A standby emergency crew must be provided by the permittee and must be available at all times during the rainy season to repair and maintain the erosion and sediment control devices.
 - (11) Erosion control materials must be stockpiled on the site for emergency repairs during the rainy season.
 - (12) Trunk storm drain facilities, if determined by the Building Official to be essential to the operation of the erosion control measures, shall be installed in place with grading operations and shall not be delayed until grading completion.
 - (13) After each rainfall, the permittee shall inspect all erosion and sediment control devices and shall clean them and repair any damage.
 - (14) Erosion control devices must be installed where drainage facilities discharge into natural channels. The devices may be rip-rap or concrete channel protection, stilling basins, check dams, drop structure or other devices which will effectively minimize erosion in the opinion of the Building Official.
 - (15) Erosion Control Planting as set forth in Section 12.44.060(g).
- (g) Notification of Noncompliance. If the soil or civil engineer finds that the work is not in conformance with this chapter or with the plans approved by the Building Official, or with good accepted practices, they shall immediately notify the permittee and the Building Official verbally and in writing of the nonconformity and of the corrective measures to be taken.
 - (h) Termination of Services. If the civil engineer, or the geotechnical engineer, or the geologist are relieved of or otherwise terminates duties prior to completion of the work shown on the grading plan, they shall report the fact in writing to the Building Official within forty-eight (48) hours with a report on the status of the work.
 - (i) Compliance With Laws. In addition to the requirements of the permit, the permittee shall comply with all laws, ordinances, and regulations of the State Department of Industrial Relations, relating to the character of the work, equipment, and labor personnel involved in the project.
 - (j) Cessation of Work. If the permittee ceases work for any reason before the work is completed, all necessary steps shall be taken to leave the premises in a condition that will be safe and will not cause damage to adjoining properties or to the public roads or to any natural or artificial drainage facilities through erosion of materials, landslides, or other instability of slopes and materials.
 - (k) Certificate of Completion. The Building Official shall issue a certificate of completion upon satisfactory completion of work under an approved permit.
 - (1) The geotechnical engineer and/or engineering geologist must certify that all compaction requirements have been complied with and sub-drains are located where shown on plans or plans are modified, as the case may be.

- (2) A licensed surveyor or registered civil engineer authorized to do survey work must certify that the horizontal and vertical controls conform to the plans or any approved changes to them.
- (3) The Building Official must be in receipt of a set of mylar plans which include all details of the grading operation and related details.

12.44.050 - Safety and general requirements.

(a) General Safety Precautions.

- (1) Adequate provisions shall be made to prevent any surface waters from damaging the cut face of an excavation or sloping surface of a fill. Retaining walls or cribbing constructed in accordance with the requirements of the Building Official shall be used wherever necessary to prevent the surface of any excavation or fill from exceeding at any point the maximum allowable slopes set forth herein.
- (2) All site drainage shall be conveyed to the nearest adequate storm drain, natural watercourse, or street approved by the Building Official as appropriate to deposit and receive such waters.

(b) Storm Damage Precautions. All persons performing any grading operations shall put into effect all safety precautions which are necessary in the opinion of the Building Official and shall remove all loose dirt from the grading site and provide adequate anti-erosion and/or drainage devices, debris basins, or other safety devices to protect the life, limb, health, and welfare of private and public property of others from damage of any kind.

(c) Protection of Utilities. During grading operations the permittee shall be responsible for the prevention of damage to any public utilities or services. This responsibility applies within the limits of grading and along any routes of travel of equipment.

(d) Protection of Adjacent Property.

- (1) No excavation shall be made sufficiently close to the property line to endanger any adjoining public street, sidewalk, alley, or other public property or any adjoining private property without supporting and protecting such adjoining public or private property from settling, cracking or other damage in a manner approved by the Building Official.
- (2) No person shall grade, whether or not a permit is required therefor under this chapter, so that dirt, soil, rock, debris, or other material washed, eroded, or moved from the property by natural or artificial means creates a public nuisance or hazard, or an unlawful encroachment on private property or on a public road or street. Any such material deposited within the right-of-way of a public road or street which may constitute a nuisance or hazard to public traffic shall be removed immediately, and failure to do so on notice from the City authorizes the City to have the material removed at the expense of the permittee.
- (3) Whenever any portion of the work requires entry onto adjacent property for any reason, the permit applicant shall obtain the written consent of the adjacent property owner or their authorized representative, and shall file a copy of such consent with the Building Official before a permit for such work may be issued.

(e) Removal of Ground Cover. Removal of ground cover shall be performed pursuant to the requirements set forth in Section 12.44.030(e).

(f) Water Obstruction. No person shall obstruct, impede or interfere with the natural flow of storm waters, whether unconfined upon the surface of the land, within land depressions or natural drainage ways, within unimproved channels or watercourses, or within improved ditches, channels or conduits, except for construction operations permitted by the City.

- (g) Levees. No person shall do any grading work on any levee without approval of the governmental agency responsible for the maintenance of the levee.
- (h) Public Rights-of-Way. No person shall perform any work or construct any facility (including excavation or embankment, trenching, driveway construction, or drainage facility) within the right-of-way of a public road or street, or within an easement under the jurisdiction of this City, without a permit from the City.
- (i) Precautions Imposed by Building Official. If, at any stage of grading, the Building Official determines by inspection that the nature of the construction is such that further work as authorized by an existing permit is likely to endanger any property or public way, the Building Official may require as a condition to allowing the work to be continued that such reasonable safety precautions be taken as the Building Official considers advisable to avoid such danger. Remedial actions may include but shall not be limited to specifying a flatter exposed slope, construction of additional drainage facilities, berms, terracing, compaction, cribbing, or retaining walls, or planting of slopes.
- (j) Abatement of Hazardous Conditions. Whenever the Building Official determines that any existing excavation or embankment or fill has become a hazard to life and limb, or endangers property, or adversely affects the safety, use, or stability of a public way or drainage channel, the owner of the property upon which the excavation or fill is located, or other person or agent in control of such property, upon receipt of notice in writing from the Building Official shall within the period specified therein repair or eliminate such excavation or embankment so as to eliminate the hazard and be in conformance with the requirements of this chapter,

12.44.060 - Design standards and grading regulations.

- (a) General Design Intent. It is the general intent of the regulations of this Chapter that site development design shall preserve to the extent that is reasonable and feasible the existing natural scenic value of hills and valleys and contours of land.
- (b) General Criteria for Design. All site development work, whether or not a permit is required under this chapter, shall be designed to:
 - (1) Retain trees and other native vegetation which stabilizes steep hillsides, retains moisture, prevents or minimizes erosion, and enhances the natural scenic beauty, insofar as practical;
 - (2) Place building pads in such a manner as to permit ample room for adequate landscaping and drainage between and around the buildings;
 - (3) Minimize scars from cuts and fills and avoid permanent scarring of the hillsides;
 - (4) Round off, in a natural manner, sharp angles at the top and toe of cut and fill slopes, and conform to existing terrain, both with respect to building sites and to road cross-sections;
 - (5) Limit development on steep or dangerous terrain;
 - (6) Take into consideration geologic hazards and adverse soil conditions and their effect on the future stability of the development.
- (c) Regulations for Excavations.
 - (1) Maximum Slope. Cuts shall not be steeper in slope than two (2) horizontal to one (1) vertical unless the owner furnishes a soil or a geological report certifying that the site has been investigated and indicating that the proposed deviation will not endanger any public or private property or result in the deposition of debris on any public way or place or interfere with any existing drainage course.

The Building Official may require the excavation to be made with a cut face flatter in slope than two (2) horizontal to one (1) vertical if he finds it necessary for stability and safety.

- (2) Drainage Terraces. Cut slopes exceeding thirty (30) feet in vertical height shall have drainage terraces not less than eight (8) feet in width, measured from the outer edge of the terrace to the invert of the drain, at vertical intervals not to exceed twenty-five (25) feet except that where only one (1) such terrace is required it shall be located at mid-height. For cut slopes exceeding one hundred (100) feet in vertical height, the drainage terrace near mid-height shall be not less than twelve (12) feet in width. Design and construction of drainage terraces shall conform to the requirements of Section 12.44.060(f). All cut slopes shall be examined for evidence of seepage at completion of grading to determine if installation of horizontal drains is necessary.
 - (3) Variations. Variations from the regulations in this section may be allowed by the Building Official if the variations will provide equivalent safety, stability, and protection against erosion, as recommended by a geotechnical engineer or engineering geologist.
- (d) Regulations for Fills.
- (1) Compaction. Except as otherwise provided in subsection (d)(2) of this section, all fills shall be compacted throughout their full extent to a minimum of ninety percent (90%) of maximum density as determined by the current ASTM D1557 test method. Field density shall be determined by a method acceptable to the Building Official. All existing on-site fills and backfills shall be excavated and stockpiled for reuse in planned fill areas.
 - (2) Exceptions to Compaction Requirement.
 - (A) Special Compaction. Compaction may be reduced to eighty-five percent (85%) of maximum density as determined by the specified test in subsection (d)(1) of this section, within the outer eight (8) inches of fill slope surfaces when such compaction is provided by grid rolling or equivalent means.
 - (B) Nonstructural Fills. Fills not intended to support structures, subdivision streets or improvements need not be compacted to the standard set forth in subsection (d)(1) of this section if the Building Official determines that such compaction is unnecessary as a safety measure. In making this determination, the Building Official may require that an investigation be made by an approved soil testing agency to establish the characteristics of the soil, the amount of settlement to be expected and the susceptibility of the soil to erosion or slippage.
 - (C) Planted Slopes. Slope surfaces may be prepared for planting by scarifying, by the addition of topsoil, or by other methods, if such loose material does not exceed a depth of three inches and said slopes otherwise comply with the requirements of this section.
 - (3) Preparation of Ground. The natural ground surface shall be pared to receive fill by removing vegetation, noncomplying fill, topsoil, and, where slopes are five (5) horizontal to one (1) vertical or steeper, by benching into sound bedrock or other competent material. Five (5) feet of the lowermost bench shall be exposed beyond the toe of the fill. The bench shall be sloped for sheet overflow or a paved drain shall be provided.
 - (4) Fill Slope. No compacted fill shall be made which creates an exposed surface steeper in slope than two (2) horizontal to one (1) vertical. The Building Official may require that the fill be constructed with an exposed surface flatter than two (2) horizontal to one (1) vertical if he finds this necessary for stability and safety.
 - (5) Fill Material. No organic or other reducible material shall be incorporated in fills. Except as recommended by the geotechnical engineer and approved by the Building Official, no rock or similar irreducible material with a maximum dimension greater than four (4) inches shall be

buried or placed within forty-eight (48) inches of finish grade. Expansive adobe soils shall not be used in fills within five (5) feet of finish grade in street and building areas and shall not be placed in the slope area of high fills.

- (6) Drainage Terraces. Fill slopes exceeding thirty (30) feet in vertical height shall have drainage terraces not less than eight (8) feet in width, measured from the outer edge of the terrace to the invert of the drain, at vertical intervals not exceeding twenty-five (25) feet except that where only one (1) such terrace is required it shall be located at mid-height. For fill slopes exceeding one hundred (100) feet in vertical height, the drainage terrace near mid-height shall be not less than twelve (12) feet in width. Design and construction of drainage terraces shall conform to the requirements of Section 12.44.060(f).
 - (7) Slopes to Receive Fill. Where fill is to be placed above the top of an existing or proposed cut or natural slope steeper than three (3) horizontal to one (1) vertical, the toe of the fill shall be set back from the top edge of the slope a minimum distance of six (6) feet, measured horizontally, or such other distance as may be specifically recommended by a geotechnical engineer or engineering geologist and approved by the Building Official. Fills shall not toe out on slopes steeper than three (3) horizontal to one (1) vertical.
- (e) Slope Location and Setbacks.
- (1) The property line of any proposed or existing site or parcel located within the grading project shall be located at the top of the slope or along any slope drainage terrace.
 - (2) Excavation and fill slopes shall be set back a minimum of three (3) feet plus one-fifth (1/5) the vertical height of the slope from the project boundary line, with a maximum of ten (10) feet.
 - (3) Buildings and structures shall be set back from excavation or fill slopes a minimum of four (4) feet plus one-fifth (1/5) of the vertical height of the slope, with a maximum of ten (10) feet.
 - (4) Variations from the regulations in this subsection (e) may be allowed by the Building Official if they will provide equivalent safety, stability, and protection against erosion, as recommended by a geotechnical engineer or engineering geologist.

(f) Regulations for Drainage.

- (1) General. Storm drainage structures, systems and facilities shall be provided as required by the Building Official and in accordance with standard specifications on file with the Building Official. In addition, storm drain structures, systems and facilities shall be in compliance with State and Federal National Pollution Discharge Elimination System (NPDES) requirements. In satisfaction of these requirements, the Building Official may require the installation of grease traps, sediment basins, storm water monitoring stations and such other devices and systems which the Building Official determines are necessary for compliance with NPDES requirements. The design of all storm drainage structures, systems and facilities shall be in accordance with recognized principles of hydraulics. Such devices shall be considered components of the Final Erosion and Sedimentation Control Plan.
- (2) Disposal. All drainage facilities shall be designed to carry surface waters to the nearest practical street, storm drain, or natural watercourses, approved by the Building Official as appropriate to discharge such waters. If the drainage device discharges onto natural ground, rip-rap or a similar energy dissipator may be required. City standard curbs and gutters shall also be installed at the property line adjoining the public right-of-way for the purpose of conveying site runoff to storm drain facilities.
- (3) Site Drainage. Graded building sites (building pads) shall have a minimum slope of one percent (1%) towards a public street or drainage facility approved to receive storm waters. A lesser slope may be approved by the Building Official for sites graded in relatively flat terrain, or where special drainage provisions are made, when he finds such modification will not result in unfavorable drainage conditions.
- (4) Terrace Drains.
 - (A) All unlined swales or ditches on drainage terraces shall have a uniform longitudinal grade of not less than one percent (1%) nor more than three percent (3%) and a minimum depth of one (1) foot at the shallowest point. Such terraces shall drain into a paved gutter, pipe or approved watercourse adequate to convey the water to a safe disposal area.
 - (B) The geotechnical engineer may approve steeper slopes based on sediment transport analysis.
 - (C) The drainage terrace shall be provided with a lined ditch, if required by the geotechnical engineer for stability or prevention of erosion.
- (5) Overflow Protection. Berms, swales or other devices shall be provided at the top of cut or fill slopes to prevent surface water from flowing over or onto, and damaging the face of the slope. Special drainage provisions shall be made where a building or structure exists within five (5) feet of the top of a slope.
- (6) Maintenance of Drainage. The permittee shall maintain drainage facilities, in conformance with the requirements of this chapter, during construction. The owner of the subdivided parcel shall maintain forever such drainage facilities as may be contained in a private storm drain easement.
- (7) Subdrains. Subdrains and laterals shall be as determined by the geotechnical engineer. Subdrain designs shall be approved by the Building Official. Provisions shall be made for carrying off collected water from all slopes to suitable disposal points.
- (8) Variations. Variations from the regulations of this section may be allowed by the Building Official if they will provide equivalent safety, stability, and protection against erosion and storm water pollution as recommended by a geotechnical engineer or engineering geologist and by the Contra Costa County Flood Control District.

(g) Erosion Control Planting.

- (1) The surface of all erodible cut slopes more than five (5) feet in height and fill slopes more than three (3) feet in height shall be protected against erosion by planting with landscape materials as prescribed in Section 12.44.030(e). The plants and planting methods shall be suitable for the soil and climatic conditions of the site and in accordance with standard specifications on file with the Building Official.
- (2) Irrigation System.
 - (A) Planted slopes shall be provided with an approved system of irrigation. A functional test of the system may be required. For slopes less than twenty (20) feet in vertical height hose bibs may be allowed where a hose no longer than fifty (50) feet is necessary for irrigation.
 - (B) The requirements for permanent irrigation systems may be modified, when approved by the Building Official, because the type of plants selected, planting methods used, and soil and climatic conditions at the site make irrigation of the slope planting unnecessary.
- (3) Approval. The planting and irrigation system shall be installed after final grading. Final approval of the work and release of the bond shall be made when growth is established on the slopes.
- (4) Variations. Variations from the regulations of this subsection may be allowed by the Building Official if the variations will provide equivalent safety, stability, and protection against erosion, as recommended by a geotechnical engineer or engineering geologist.

(h) Other Regulations.

- (1) Hours of Work. If operations under the permit are within five hundred (500) feet of residential or commercial occupancies, grading operations shall be limited to the hours between 8 a.m. and 5 p.m. Monday through Friday, or as approved by the Building Official, except that maintenance and service work on equipment may be performed until 9:00 p.m.
- (2) Encroachments on Public Rights-of-Way. Encroachment of operations on public rights-of-way without a valid encroachment permit is prohibited except for hauling of legal loads by vehicles permitted by law to operate on public roads.
- (3) Nuisances. Operations shall be controlled to prevent nuisances to public and private ownerships because of dust, drainage, removal of natural support of land and structures, encroachment, noise, and/or vibration.
- (4) Explosives. Blasting or other use of explosives shall be conducted in accordance with regulations by the City Council, the State Fire Marshal, and local fire authorities.

(i) Responsibility of Permittee.

- (1) Compliance With Plans and This Chapter. The permittee, his agent, contractor or employee, shall carry out the proposed work only in accordance with the approved plans and specifications and in compliance with all the requirements of this chapter.
- (2) Notice of Work. In performing regular development work it shall be the responsibility of the permittee to notify the Building Official at least one working day in advance so that the required inspections can be made.

(j) Reports Required and Final Approval. The Building Official may require the following reports, as cited in Section 12.44.040(k) and shall not finally approve any development or work until all required maps and reports have been submitted and approved, including the following:

- (1) A final report by the civil engineer certifying that all grading, lot drainage and drainage facilities have been completed and the slope planting installed in conformance with the approved plans

and the requirements of this chapter with a final contour map if the work is not in substantial conformity with the approved plans.

- (2) A report by the geotechnical engineer including the recommended soil-bearing capacity, a statement as to the expansive qualities of the soil, summaries of field and laboratory tests, and his opinion as to the adequacy of the work completed and its conformity with plans and specifications. The location of such tests and the limits of the compacted fill shall also show by plans and cross section the location of any subdrains, rock disposal areas and/or buttress fills in the work.
 - (3) An engineering geologist's report based on the final contour map including specific approval of the grading as affected by geological factors. The report shall include a revised geologic map and cross sections, with recommendations regarding the location of buildings or sewage disposal systems.
- (k) Evaluation of Existing Fill. The Building Official may require the submission of a preliminary soil investigation report and/or engineering geological report before issuing a building permit for a structure to be placed on any fill or embankment constructed before the enactment of this chapter, or excepted from the requirement for a grading permit, or on any other lot or parcel on which critically expansive soils, slide conditions, or other soils, or geologic hazards exist or may reasonably be anticipated to exist. If the Building Official determines that the action recommended in this report is likely to prevent structural damage to the proposed structure, he shall recommend that the requirements contained in the report shall become a part of the required construction as a condition of the permit.

12.44.070 - Appeals.

- (a) Any applicant or any permittee or his surety, if any, taking exception to any condition imposed upon his grading permit, or to any denial thereof, or to the revocation or suspension thereof, shall have the right to a hearing before the City Manager, or the City Manager's designee, prior to the implementation of the condition or adverse permit action.
- (b) Prior to any denial, revocation or suspension of the permit, the Building Official shall give the appellant written notice of the denial, revocation or suspension. The notice shall set forth the ground or grounds for the denial, revocation or suspension and shall inform the appellant that the appellant has ten days from the date of receipt of the notice to file a written request for a hearing.
- (c) Within ten days of the written notice by the Building Official regarding a permit denial, suspension or revocation, or within ten days of receipt of a permit which contains an objected to condition, the appellant may appeal by submitting a request to the Building Official for a hearing before the City Manager, or the City Manager's designee. Such request must be made in writing and must set forth the specific grounds for the appeal. If the applicant or permittee files a timely hearing request, the City Manager, or the City Manager's designee, shall set a time and place for the hearing. All parties involved shall have the right to offer testimonial, documentary and tangible evidence bearing on the issues, to be represented by counsel and to confront and cross-examine any witnesses against them. The decision of the City Manager, or the City Manager's designee, shall be in writing and shall be the final administrative decision.
- (d) If no timely appeal is taken, the action of the Building Official shall be deemed final. If a timely appeal request is made by a permittee with regards to a permit suspension or revocation, the permit shall remain in force and effect until a decision on appeal has been made by the City Manager, or the City Manager's designee.

12.44.080 - Nuisances.

- (a) What Constitutes Nuisance. The following shall constitute a public nuisance:
- (1) Any grading without a permit where same is required by this chapter;
 - (2) Any grading or other work done in violation of any of the conditions imposed thereon by a permit issued pursuant to this chapter;
 - (3) Any grading or other work which fails to be done as required by any conditions of a permit issued pursuant to this chapter;
 - (4) The existence of a hazardous condition as defined in Section 12.44.050(j) of this chapter upon the determination by the Building Official as provided in said section that such condition exists.
- (b) Abatement of Nuisance. The Building Official, or the Building Official's designee, may summarily abate or cause to be abated any condition which is declared in Section 12.44.080(a) to be a public nuisance or may abate or cause to be abated any such public nuisance in any other manner established by statute, law, ordinance, rule, or regulation of the State of California or of the City of Richmond, or may apply to a court of competent jurisdiction for appropriate relief, including but not limited to an order requiring or causing the abatement of any such public nuisance. The costs and expenses of such abatement shall become a lien upon the real property or premises upon which such public nuisance exists.
- (c) Procedure Not Exclusive. The procedure provided in this chapter shall be cumulative and in addition to any other procedure or procedures provided in ordinances of this City or by State law for the abatement of any of the conditions described herein, and abatement hereunder shall not prejudice or affect any other action, civil or criminal, for the maintenance of any other action, civil or criminal, for the maintenance of any such condition.

(Source: Ordinance No. 19-97 N.S.)

CITY OF RICHMOND STANDARD – GENERAL PLAN

Chapter 15.02 - GENERAL PLAN

Sections:

15.02.010 - Title.

This chapter shall be known as the "General Plan Ordinance of the City of Richmond" and may be so cited and pleaded.

15.02.020 - Adoption of state procedures.

A comprehensive, long-term and general plan for the physical development of the City shall be adopted and amended in accordance with Section 65300, et seq. of the California Government Code.

15.02.030 - Zoning ordinance to be consistent with general plan.

The zoning ordinance whose purpose is to regulate existing uses and uses contemplated in the future shall be made consistent with the general plan as required by State law. In order to carry out this objective, either the zoning ordinance or the general plan shall be amended to achieve such consistency. Whenever a request for a change in the zoning ordinance is found to be consistent with the general plan, the necessary change in the general plan to establish consistency must be adopted prior to adoption of the requested change in the zoning ordinance.

"Consistent with," as used in this section, means that the zoning ordinance requirements and precise zoning must be in harmony with and compatible with the general plan so that they will not preclude the orderly realization of the objectives of the general plan within the period of time contemplated by the general plan. Zone regulations which require approval of special permits such as conditional uses, controlled development plans, and planned area district developments before development begins, shall be considered to be consistent with the general plan.

15.02.040 - Amendments of general plan.

Applicants proposing zone changes or permits for uses which the Commission finds to be inconsistent with the general plan, shall file an application for an amendment of the general plan to be considered concurrently with said proposals.

- a. FILING AND PROCESSING FEE. A filing and processing fee shall be paid in the amount and manner as set by resolution of the City Council.

(Source: Ordinance No. 7-82 N.S.)

CITY OF RICHMOND STANDARD – ZONING PLAN – Abbreviated, Sections Relating to Trees, Planting and Landscape Standards

Article XV, Zoning and Subdivision of the Richmond Municipal Code Adopted November 15, 2016 (Ordinance No. 16-16)

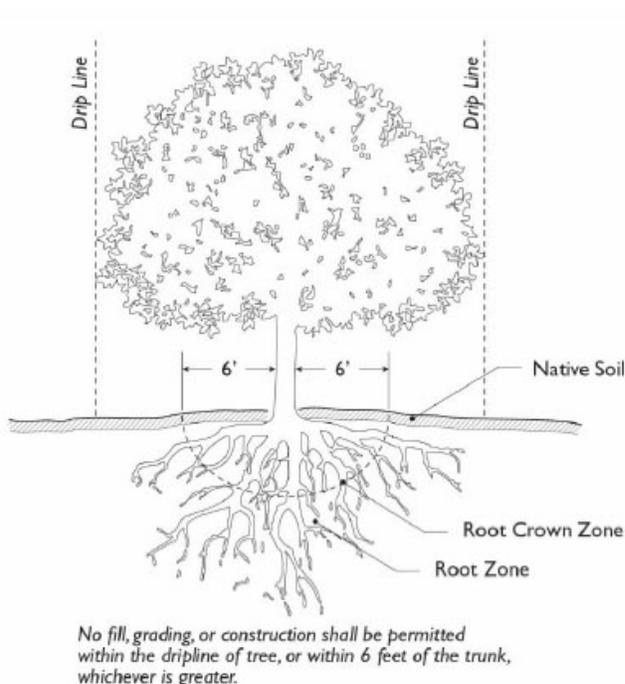
Chapter 15.04 Zoning & Subdivision Regulations – Relevant Sections:

Article 15.04.201.050 - Development Standards – RM Districts

15.04.201.100.F. Trees.

1. Preserving Trees During Construction.
 - a. No fill, grading, or construction shall be permitted within the drip line of any tree (or within six feet of the trunk, whichever is greater) designated for preservation except as may be recommended by an arborist or forester.
 - b. Trenching shall be prohibited within the tree drip line, and any required utility line within the tree drip line shall be installed by boring or drilling through the soil.
 - c. Where necessary for access in the vicinity of trees designated for preservation, paving within the drip line shall use porous materials such as gravel, loose boulders, cobbles, wood chips, or bark mulch.

] **FIGURE 15.04.201.100-F(1): TREE PRESERVATION**



2. Criteria for Tree Removal. In assessing the number of trees and specific trees that may be removed, the Planning Commission shall consider the following criteria as identified in an arborist report submitted by the applicant:
 - a. Whether the tree is in poor health and cannot be saved;
 - b. Whether the tree is a public nuisance, causing damage to public utilities or streets and sidewalks that cannot be mitigated by some other means (such as root barriers etc.);
 - c. Whether the tree is in danger of falling and cannot be saved by some other means (such as pruning);
 - d. Whether the tree is damaging existing private improvements on the lot (e.g., building foundation, wall, patio, deck, roof, retaining wall, etc.);
 - e. Whether the tree species is known to be highly combustible and is determined to be a fire hazard;
 - f. Whether reasonable development of the property would require the alteration or removal of the tree and could not be reasonably accommodated elsewhere on the lot; and
 - g. Whether the tree species is known to develop weaknesses that affect its health or the safety of people and property (e.g., short-lived, weakwooded and subject to limb breakage, shallow-rooted and subject to toppling).

3. Whenever Significant Trees Are Removed.
 - a. Trees shall be replaced at a ratio of at least 3 new trees for every tree removed. Replacement trees shall be planted in the following order of priority: (i) on the project site; (ii) on adjacent private or public land, or along public streets, or (iii) within five miles of the site of the removal.
 - b. The minimum tree size shall be 15 gallons. Exception to this requirement may be allowed by the Planning Commission when site conditions warrant.
 - c. To protect trees during construction one or both of the following measures shall be taken: (i) construct fencing around the drip line of each tree or group of trees to be retained; and (ii) establish an incentive program in the construction contract to encourage workers, particularly bulldozer drivers, to maximize caution when working near trees (such as a fine for each damaged tree or subtract the fine from a bonus to be divided among all construction workers at the end of the project).
 - B. The following are exempt:
 1. Registered local, state or federal historical sites;
 2. Ecological restoration projects that do not require a permanent irrigation system; and
 3. Plant collections, as part of botanical gardens and arboretums open to the public.
 - C. Recognizing the special landscape management needs of cemeteries, new and rehabilitated cemeteries are only subject to the requirements of subsection

15.04.613.060(D) and Sections 15.04.613.080-090.

Article 15.04.613 - Water-Efficient Landscaping

Sections:

15.04.613.010	Purpose and Authority
15.04.613.020	Applicability
15.04.613.030	Areas to be Landscaped
15.04.613.040	General Landscape Standards
15.04.613.050	Required Trees
15.04.613.060	Required Plans and Supporting Materials
15.04.613.070	Certificate of Completion
15.04.613.080	Post Installation Irrigation Scheduling
15.04.613.090	Maintenance and Irrigation Audit Reporting
15.04.613.100	Model Homes

15.04.613.010 Purpose and Authority

The specific purposes of the water-efficient landscape regulations are to:

- A. Improve the appearance of the community by requiring aesthetically pleasing landscaping on public and private sites;
- B. Aid in energy conservation by providing shade from the sun and shelter from the wind;
- C. Soften the appearance of parking lots and other development through landscaping;
- D. Conserve water resources through the use of native and drought-tolerant plants and water-conserving irrigation practices;
- E. Restore natural communities and provide habitat through the reestablishment of native plants;
- F. Assist in mitigating air quality impacts by reducing or absorbing pollutants; and
- G. Minimize or eliminate conflicts between potentially incompatible but otherwise permitted land uses on adjoining lots through visual screening.

These regulations are intended to comply with the requirements of California Government Code of Regulations, Title 23, Division 2, Chapter 2.7 for a "water efficient landscape ordinance".

15.04.613.020 Applicability

- A. This Article applies to the following landscape projects associated with any development requiring a building permit, design review, or a use permit:
 - 1. New landscape installations of 500 square feet or more;
 - 2. Rehabilitated landscapes with an area 2,500 square feet or more;
 - 3. New construction and rehabilitated landscapes that are developer-installed in single-family and multi-family projects with a landscape area equal to or greater than 2,500 square feet requiring a building permit, design review, or other discretionary permit; and
 - 4. New construction landscapes that are homeowner-provided and/or homeowner-hired in single-family and multi-family residential projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building permit, design review or other discretionary permit.

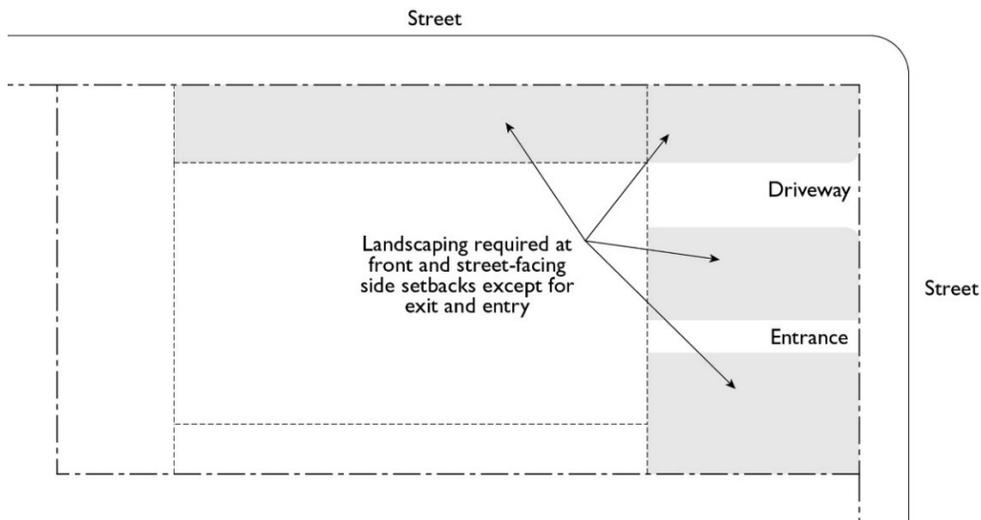
- B. The following are exempt:
 1. Registered local, state or federal historical sites;
 2. Ecological restoration projects that do not require a permanent irrigation system; and
 3. Plant collections, as part of botanical gardens and arboretums open to the public.
- C. Recognizing the special landscape management needs of cemeteries, new and rehabilitated cemeteries are only subject to the requirements of subsection 15.04.613.060(D) and Sections 15.04.613.080-090.

15.04.613.030 Areas to be Landscaped

The following areas shall be landscaped, and may count toward the total area of site landscaping required by the zoning district regulations and other citywide or special purpose landscape regulations.

- A. **Required Setbacks.** All required front and street-facing side setbacks, except for areas used for exit and entry, shall be landscaped.

FIGURE 15.04.613.030-A: REQUIRED SETBACKS



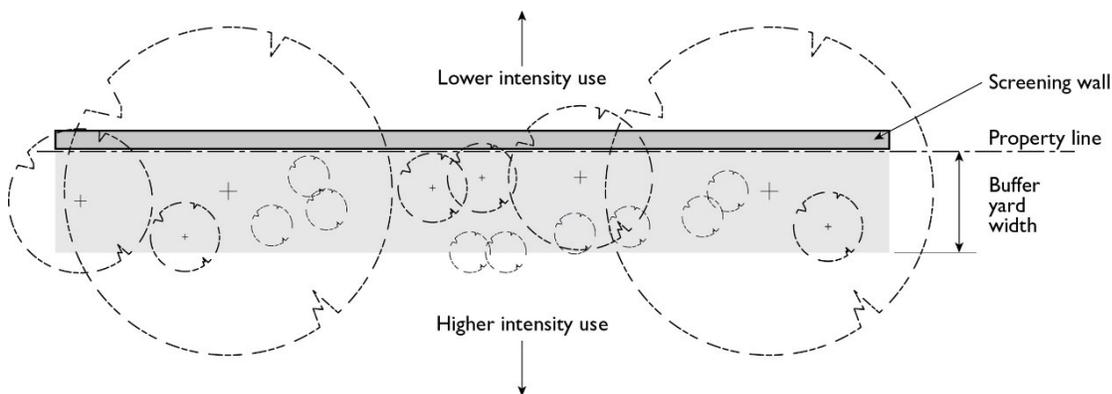
- B. **Lot Perimeters.** Landscape buffers shall be installed and maintained along side and rear lot lines between differing land uses, in accordance with the following standards.
 1. **Required Landscape Buffers.** Table 15.04.613.030-B(1), Required Landscape Buffers, shows when a buffer treatment is required, and of what type, based on the proposed and the adjoining use. Only the proposed use is required to provide the buffer yard. Adjoining uses are not required to provide the buffer yard. The type of buffer yard required refers to buffer yard-type designations as shown in the table and defined in subsection (2), below. "-" means that a buffer yard is not required unless required by another section of this Article.

TABLE 15.04.613.030-B(1): REQUIRED LANDSCAPE BUFFERS						
Use	Adjoining Use					
	Park or Open Space	Single-unit Residential	Multi-unit Residential	Mixed Use	General Commercial	Industrial
Multi-unit Residential	Type 1	Type 1	-	-	-	-
Mixed Use	Type 2	Type 2	Type 2	-	-	-
Commercial	Type 2	Type 2	Type 2	-	-	Type 1
Industrial	Type 2	Type 2	Type 2	Type 2	Type 2	-

2. **Buffer-yard Types.** Table 15.04.613.030-B(2), Buffer Yard Requirements, describes the minimum width, plant materials, and wall requirements for each type of buffer yard. The listed number of trees and shrubs are required for each 100 lineal feet of buffer yard. Trees shall be planted at least 40 feet on center. Natural areas with native vegetation or alternative planting materials which achieve equivalent buffering effects may be approved by the Zoning Administrator.

TABLE 15.04.613.030-B(2): BUFFER YARD REQUIREMENTS					
Buffer Yard Type	Minimum Width (ft.)	Trees		Shrubs	
		Canopy (mature height of 40 ft. or more)	Understory (mature height of less than 40 ft.)	Large (mature spread of 2 ft. or more)	Small (mature spread of less than 2 ft.)
Type 1	5	2	2	4	8
Type 2	10	2	3	6	8

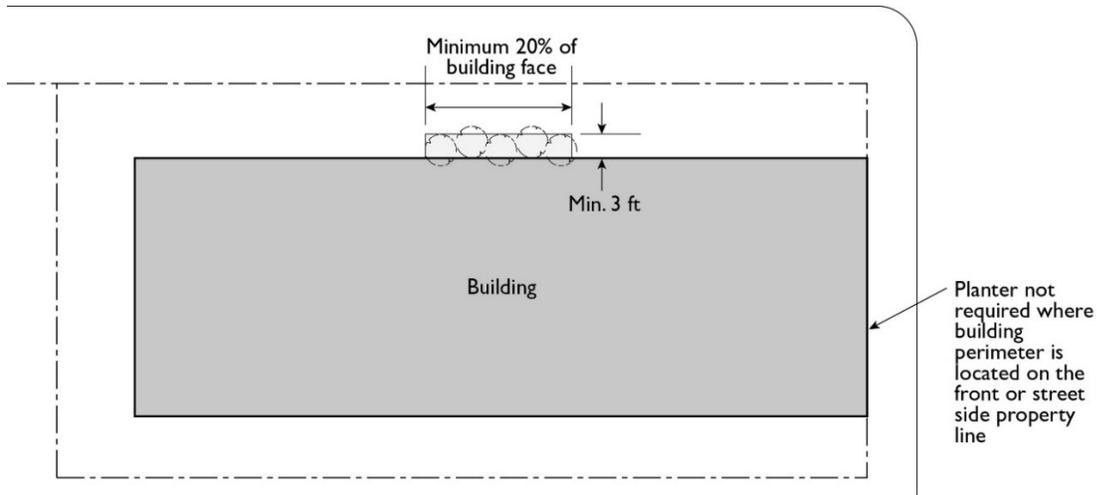
FIGURE 15.04.613.030-B(2): BUFFER YARD REQUIREMENTS



3. **Width Reduction for Adjacent Landscaped Buffer.** If an equivalent landscape buffer exists on the adjacent lot, the width of the required buffer may be reduced 50 percent provided that the abutting property owners have provided a written agreement restricting the use of the adjacent landscape buffer.

- C. **Building Perimeters.** The portions of a building that front a public street shall have one or more landscape planters installed along a minimum 20 percent of that building face. The minimum width of the planter shall be three feet. This standard does not apply where a building is located on the front or street side property line.

FIGURE 15.04.613.030-C: BUILDING PERIMETERS



- D. **Parking Areas.** Parking areas shall be landscaped as required by Article 15.04.607 (Parking and Loading Standards).
- E. **Unused Areas.** All areas of a project site not intended for a specific use, including areas planned for future phases of a phased development, shall be landscaped or left in a natural state.

15.04.613.010 General Landscaping Standards

- A. **General.** Landscaping may consist of a combination of ground cover materials, shrubs, and trees. Ground cover may include grasses, shrubs, perennials, vines, or other herbaceous or non-herbaceous plants. Ground cover also includes, mulch such as gravel, rock, cinder, bark, or other permeable materials, provided that such materials present an attractive setting consistent with the intent of this Article. Landscaping may also include incidental features, such as stepping-stones, site furniture, water features, art, or other ornamental features placed within a landscaped setting.
- B. **Plant Materials.**
 - 1. **Turf Allowance.** The maximum amount of turf in required landscape areas is 30 percent for non-residential uses and 50 percent for residential uses, except for turf areas that comprise an essential component of a project (e.g., golf courses or playing fields), which are exempt from this limit. Turf is prohibited on slopes greater than 25 percent.
 - 2. **Plant Selection.**
 - a. Any plant that is not specifically prohibited may be selected for the landscape, providing the Estimated Total Water Use (ETWU) in the landscape area does not exceed the Maximum Applied Water Allowance (MAWA) Methods to achieve water efficiency include one or more of the following:

- i. Protection and preservation of native species and natural vegetation;
 - ii. Selection of water-conserving plant, tree and turf species, especially local native plants;
 - iii. Selection of plants based on local climate suitability, disease and pest resistance; and
 - iv. Selection of trees based on size at maturity as appropriate for the planting area.
 - b. Plants must be selected and planted appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the project site. Methods to achieve water efficiency include:
 - i. Using the Sunset Western Climate Zone System which takes into account temperature, humidity, elevation, terrain, latitude, and varying degrees of continental and marine influence on local climate;
 - ii. Recognizing the horticultural attributes of plants (i.e., mature plant size, invasive surface roots) to minimize damage to property or infrastructure (e.g., buildings, sidewalks, power lines) and to allow for adequate soil volume for healthy root growth; and
 - iii. Using solar orientation for plant placement to maximize summer shade and winter solar gain.
 - c. *Common Interest Development Guidelines.* The architectural guidelines of a common interest development, which include community apartment projects, condominiums, planned developments, and stock cooperatives, may not prohibit or include conditions that have the effect of prohibiting the use of low-water use plants as a group.
- C. **Water Features.** Recirculating water systems must be used for water features. The surface area of a water feature must be included in the high water use hydrozone area of the water budget calculation.
- D. **Soil Preparation.** Prior to the planting of any materials, compacted soils must be transformed to a friable condition. On engineered slopes, only amended planting holes need meet this requirement.
- E. **Mulch.** A minimum three-inch layer of mulch must be applied on all exposed soil surfaces of planting areas except in turf areas, areas receiving closely spaced plugs as a lawn alternative, or direct seeding applications where mulch is contraindicated. To provide habitat for beneficial insects and other wildlife, up to five percent of the landscape area may be left without mulch. Stabilizing mulching products must be used on slopes that meet current engineering standards. The mulching portion of the seed/mulch slurry in hydro-seeded applications must meet the mulching requirement. Use of organic mulch materials made from recycled or post-consumer material is preferred over inorganic materials or virgin forest products unless the recycled post-consumer organic products are not locally available.

15.04.613.050 Required Trees

- A. **On-Site Trees.** On-site trees must be provided as follows:
 - 1. **Residential Zoning Districts.** One tree for every 1,000 square feet of lot area for residential development.
 - 2. **Mixed-Use and Commercial Zoning Districts.** One tree for every 2,000 square feet of lot area.
 - 3. **Industrial Zoning Districts.** One tree for every 5,000 square feet of lot area.
 - 4. **Off-Site Planting.** If the lot size or other site conditions make planting of the required trees impractical, the Zoning Administrator may allow the trees be planted off-site at twice the ratio.
 - 5. **Exception for Existing Trees.** If the required number and size of trees already exists on the site, the applicant shall not be required to plant new trees on-site.

- B. **Street Trees.** All new development must provide at least one street tree that is a minimum of 1 ½ inches diameter at breast height or 15 gallons in size for each 50 linear foot of street frontage unless the Director of Engineering and Capital Improvement Projects determines that a different number of trees is warranted because of existing conditions and the number of street trees in the vicinity. All street trees, must be installed with approved root and/or any other tree plantings within 10 feet of the public right-of-way, including sidewalks, curbs and gutters, or street surface barriers and deep water tubes (three per tree).

- C. **Maintenance.** All trees must be maintained to be free from physical damage or injury arising from lack of water, chemical damage, accidents, vandalism, insects and disease. Any tree showing such damage to the extent that its life would be impaired must be replaced with another tree.

15.04.613.060 Required Plans and Supporting Materials

- A. **General Requirements.** The section establishes what required documentation must be provided for all non-exempt landscape projects unless they qualify for streamlined submittal requirements. Streamlined submittals are available for two specific types of projects:
 - 1. **Small Sites.** A project with a landscape area of 2,500 square feet or less that complies with the prescriptive measures listed in subsection (H), below, are exempt from certain submittal requirements for the Landscape Documentation Package.
 - 2. **Graywater or Rainwater Projects.** For projects using treated or untreated graywater or rainwater captured on site, any lot or parcel within the project that has less than 2,500 square feet of landscape and meets the lot or parcel’s landscape water requirement (Estimated Total Water Use) entirely with treated or untreated graywater or through stored rainwater captured on site is subject only to the requirements of paragraph (H)(6), below.
 - 3. **Existing Landscape.** All existing landscape over one acre in size may be required to have an irrigation audit under subsection 15.04.613.090(B) if a property owner proposes an expansion of floor area that is more than 10 percent of existing floor area or structural alterations that exceed 10 percent of the replacement cost of the building. Restrictions on overspray and runoff may be imposed as conditions of approval of a discretionary permit in order to conserve water.

B. **Landscape Documentation Package.** A Landscape Documentation Package must be submitted by the project applicant for review and approval prior to start of construction. The Landscape Documentation Package must include the following elements, shown on either plan sheets or supplemental pages:

1. **Project Information Sheet.** The plan information must include, but is not limited to, the following: date; project name; project address, parcel, and/or lot number(s); total landscape area (square feet) and rehabilitated landscape area (if applicable); project type (e.g., new, rehabilitated, public, private, public, private, cemetery, homeowner-installed); water supply type (e.g., potable, recycled, well) and identification of the local retail water purveyor if the project applicant is not served by a private well; checklist or index of all documents in the Landscape Documentation Package; project contacts information for the project applicant and property owner.
2. **A Landscape Design Plan:** see subsection (C), below.
3. **A Water-Efficient Landscape Worksheet:** see subsection (D), below.
4. **A Soil Management Plan:** see subsection (E), below.
5. **An Irrigation Design Plan:** see subsection (F), below.
6. **A Grading Design Plan:** see subsection (G), below.

C. **Landscape Design Plan.** The Landscape Design Plan must identify all of the following, to the extent they apply:

1. Proposed plant locations, species, and sizes.
2. Location of any existing trees over six inches in diameter at breast height, each tree's diameter at breast height, and whether such tree is proposed for retention or removal.
3. Recreational areas.
4. Areas permanently and solely dedicated to edible plants.
5. Each hydrozone, labeled or identified by number, letter or other method and noted as low, moderate, high water or mixed water use. Temporarily irrigated areas of the landscape must be included in the low water use hydrozone of the water budget calculation. Each hydrozone must have plant materials with similar water use, with the exception of hydrozones with plants of mixed water use.
6. Areas irrigated with recycled water.
7. Type of mulch and application depth and proposed soil amendments by type and quantity.
8. Type and surface area of water features.
9. Hardscapes (pervious and non-pervious).
10. Location, installation details, and 24-hour retention or infiltration capacity of on-site stormwater retention areas.
11. Any applicable rain harvesting or catchment technologies and their 24-hour retention or infiltration capacity.
12. Any applicable graywater discharge piping, system components and area(s) of distribution.

13. In Fire-Prone Areas. A Landscape Design Plan for projects in fire-prone areas must address fire safety and prevention. A defensible space or zone around a building or structure is required by the Public Resources Code Section 4291(a) and (b).

D. **Water Efficient Landscape Calculations and Alternatives.** A fully-completed Water Efficient Landscape Worksheet (available from the Zoning Administrator)⁴ must contain information on the plant factors, irrigation method, irrigation efficiency and area associated with each hydrozone and show:

1. The Estimated Total Water Use (ETWU) allowable for the landscape area (LA) does not exceed the Maximum Applied Water Allowance (MAWA); and
2. The evapotranspiration adjustment factor (ETAF) for the landscape project does not, on average, exceed a factor of 0.55 for residential areas and 0.45 for non-residential areas, exclusive of Special Landscape Areas (SLA), within the landscape project, which are calculated using an ETAF of 1.0.

Water efficiency calculations must be calculated as follows:

Maximum Applied Water Allowance (MAWA)

$$MAWA = (25.92) \times [(ETAF \times LA) + ((1-ETAF) \times SLA)]$$

Estimated Total Water Use (ETWU)

$$ETWU = 25.92 \left(\frac{PF \times HA}{IE} + SLA \right)$$

3. **Variables Used in Water Efficiency Calculations.**

- a. *Plant Factors (PF).* The plant factors range from 0 to 0.1 for very low water using plants, 0.1 to 0.3 for low water use plants, from 0.4 to 0.6 for moderate water use plants, and from 0.7 to 1.0 for high water use plants. Any and all water features must be included in the high water use hydrozone. Any and all temporarily irrigated areas must be included in the low water use hydrozone.
- b. *Landscape Areas (LA).* Total Landscape Area, expressed in square feet, include all areas dedicated to planting, turf, and water features, excluding footprints of building or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, pervious or non-pervious hardscapes, or other non-irrigated areas designated for non-development (e.g., open spaces and existing native vegetation).
- c. *Special Landscape Areas (SLA).* Special Landscape Areas are areas of the landscape dedicated solely to edible plants, recreational areas,

⁴ The State's Model Water-efficient Landscape Ordinance includes a sample worksheet, which can be posted on the City's website and be a Microsoft Excel for or in other interactive form to make it easy to use.

- d. *Irrigation Efficiency (IE)*. For the purpose of determining Estimated Total Water Use, the average IE is assumed to be 0.75 for overhead spray devices and 0.81 for drip system devices.
 - e. *Hydrozone Area (HA)*. The square feet in the hydrozone. Note that PF x HA as used in the formula for calculating ETWU is the sum of the individual PF and respective HA calculations.
4. **Evapotranspiration Adjustment Factor (ETAF)**. The ETAF for a landscape project is calculated based on the plant factors and irrigation methods selected. The Water Efficient Landscape Worksheet must show that the average ETAF for Regular Landscape Areas is no greater than 0.55 for residential areas and 0.45 for non-residential areas. The ETAF for Special Landscape Areas can be up to 1.0.
- E. **Soil Management Report**. A Soil Management Report must include:
- 1. **Analysis of Soil Samples**. Soil samples must be submitted to a laboratory for analysis and recommendations.
 - a. Soil sampling must be conducted in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.
 - b. The soil analysis must include:
 - i. Soil texture;
 - ii. Infiltration rate determined by laboratory test or soil texture infiltration rate table;
 - iii. pH;
 - iv. Total soluble salts;
 - v. Sodium;
 - vi. Percent organic matter; and
 - vii. Recommendations
 - c. In residential projects with multiple landscape installations, a soil sampling rate of one in seven lots or approximately 15 percent will satisfy this requirement. Large landscape projects must sample at a rate equivalent to one in seven lots.
 - 2. **Timing of Submittal**.
 - a. If significant mass grading is not planned, the Soil Management Report must be submitted as part of the Landscape Documentation Package.
 - b. If significant mass grading is planned, the Soil Management Report must be submitted as part of the Certificate of Completion.
 - 3. **Availability of Report to Landscape Professionals**. The Soil Management Report must be made available, in a timely manner, to the professionals preparing the landscape design and irrigation design plans.
 - 4. **Implementation Verification**. Verification of implementation of the Soil Management Report recommendations must be submitted with the Certificate of Completion.

- F. **Irrigation Design Plan.** The Irrigation Design Plan, at a minimum, must contain:
1. The location and size of separate water meters for landscape;
 2. The location, type and size of all components of the irrigation system, including controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, pressure regulators, and backflow prevention devices;
 3. Static water pressure at the point of connection to the public water supply; and
 4. Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each station.
 5. **Design Criteria for Hydrozones.**
 - a. Each valve must irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use.
 - b. Sprinkler heads and other emission devices must be selected based on what is appropriate for the plant type within that hydrozone.
 - c. Where feasible, trees must be placed on separate valves from shrubs, groundcovers, and turf to facilitate the appropriate irrigation of trees. The mature size and extent of the root zone must be considered when designing irrigation for the tree.
 - d. Individual hydrozones that mix plants of moderate and low water use, or moderate and high water use, may be allowed if:
 - i. The plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or
 - ii. The plant factor of the higher water using plant is used for calculations.
 - e. Individual hydrozones that mix high and low water use plants are not permitted.
 6. The installation of the water irrigation systems must allow for the current and future use of recycled water when feasible. All recycled water irrigation systems must be designed and operated in accordance with all applicable City regulations and State laws.
 7. **System Components.**
 - a. *Landscape Water Meters.* Landscape water meters, defined as either a dedicated water service meter or private submeter, must be installed for all non-residential irrigated landscapes of 1,000 square feet or more and residential irrigated landscapes of 5,000 square feet or more. A landscape water meter may be either:
 - i. A customer service meter dedicated to landscape use provided by the local water purveyor; or
 - ii. A privately owned meter or submeter.
 - b. *Soil Moisture or Evapotranspiration-Based Irrigation Controllers.* Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data utilizing non-volatile memory is required for irrigation scheduling in all irrigation systems.

- c. *Pressure Regulating Devices.* If the water pressure is below or exceeds the recommended pressure of the specified irrigation devices, the installation of a pressure regulating device is required to ensure that the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.
 - i. If the static pressure is above or below the required dynamic pressure of the irrigation system, pressure-regulating devices such as inline pressure regulators, booster pumps, or other devices must be installed to meet the required dynamic pressure of the irrigation system.
 - ii. Static water pressure, dynamic or operating pressure, and flow reading of the water supply must be measured at the point of connection. These pressure and flow measurements must be conducted at the design stage. If the measurements are not available at the design stage, the measurements must be conducted at installation.
- d. *Weather-Based Irrigation Controllers.* Sensors (rain, freeze, wind, etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions are required on all irrigation systems, as appropriate for local climatic conditions. Irrigation should be avoided during windy or freezing weather or during rain.
- e. *Manual Shut-Off Valves.* Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) are required, as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency (such as a main line break) or routine repair.
- f. *Backflow Prevention Devices.* Backflow prevention devices are required to protect the water supply from contamination by the irrigation system.
- g. *Flow Sensors.* Flow sensors that detect high flow conditions created by system damage or malfunction are required for all on non-residential landscapes and residential landscapes of 5,000 square feet or more.
- h. *Master Shut-Off Valves.* Master shut-off valves are required on all projects except landscapes that make use of technologies that allow for the individual control of sprinklers that are individually pressurized in a system equipped with low pressure shut down features.
- i. *Prevent Water Waste.* The irrigation system must be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures.
- j. *Irrigation Efficiency (IE).* The irrigation system must be designed and installed to meet, at a minimum, the irrigation efficiency criteria regarding the Maximum Applied Water Allowance.
- k. *Meet ASABE/ICC Standard.* All irrigation emission devices must meet the requirements of the American National Standards Institute (ANSI) and the American Society of Agricultural and Biological Engineers'/International Code Council's (ASABE/ICC) 802-2014 "Landscape Irrigation Sprinkler and Emitter Standard." All sprinkler heads must have a documented distribution uniformity low quarter of 0.65 or higher using protocols in ASABE/ICC 802-2014.
- l. *Peak Water Operating Demands or Restrictions.* It is highly recommended

that the project applicant inquire with the local water purveyor about peak water operating demands (on the water supply system) or water restrictions that may impact the effectiveness of the irrigation system.

- m. *Mulched Planting Areas.* In mulched planting areas, the use of low volume irrigation is required to maximize water infiltration into the root zone.
- n. *Matched Precipitation Rates.* Sprinkler heads and other emission devices must have matched precipitation rates, unless otherwise directed by the manufacturer's recommendations.
- o. *Head to Head Coverage.* Head to head coverage is recommended. However, sprinkler spacing must be designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations.
- p. *Riser-Protection Components.* Swing joints or other riser-protection components are required on all risers subject to damage that are adjacent to hardscapes or in high traffic areas of turf.
- q. *Low Point Drainage.* Check valves or anti-drain valves are required on all sprinkler heads where low point drainage could occur.
- r. *Areas Less Than Ten Feet Wide.* Areas less than 10 feet in width in any direction must be irrigated with subsurface irrigation or other means that produces no runoff or overspray.
- s. *Adjacent to Non-Permeable Surfaces.* Overhead irrigation is not permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, drip line, or other low flow non-spray technology. The surfacing of the setback may be mulch, gravel, or other porous material. These restrictions may be modified if:
 - i. The landscape area is adjacent to permeable surfacing and no runoff occurs;
 - ii. The adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping; or
 - iii. The irrigation designer specifies an alternative design or technology and clearly demonstrates strict adherence to irrigation system design criteria. Prevention of overspray and runoff must be confirmed during the irrigation audit.
- t. *Slopes Greater Than 25 Percent.* Slopes greater than 25 percent shall not be irrigated with an irrigation system with an application rate exceeding 0.75 inches per hour. This restriction may be modified by the Zoning Administrator if the landscape designer specifies an alternative design or technology, and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion must be confirmed during the irrigation audit.

G. The Grading Design Plan.

- 1. The Grading Design Plan must indicate finished configurations and elevations of the landscape area, including:
 - a. Height of graded slopes;

- b. Drainage patterns;
 - c. Pad elevations;
 - d. Finish grade; and
 - e. Stormwater retention improvements, if applicable.
2. To prevent excessive erosion and runoff, project applicants may be required to:
- a. Grade so that all irrigation and normal rainfall remains on-site and does not drain on to non-permeable hardscapes;
 - b. Avoid disruption of natural drainage patterns and undisturbed soil; and
 - c. Avoid soil compaction in landscape areas.

H. **Prescriptive Compliance Option for Smaller Sites.** Landscape projects that involve 2,500 square feet or less of landscape area may be approved through a Zoning Compliance review if the applicant meets all of the following requirements. Under this procedure, no landscape design plan needs be prepared, and requirements for a water-efficient landscape worksheet, a soil management plan, an irrigation design plan, and a grading design plan are waived.

1. Submit a Prescriptive Compliance Landscape Documentation Package that includes the following elements:
 - a. Date;
 - b. Project applicant;
 - c. Project address (if available, parcel and/or lot number(s));
 - d. Total landscape area (square feet), including a breakdown of turf and plant material;
 - e. Project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed);
 - f. Water supply type (e.g., potable, recycled, well) and identification of the local retail water purveyor if the applicant is not served by a private well;
 - g. Contact information for the project applicant and property owner; and
 - h. Applicant signature and date with statement, "I agree to comply with the requirements of the prescriptive compliance option of the City of Richmond's Water-Efficient Landscape Regulations."
2. Incorporate compost at a rate of at least four cubic yards per 1,000 square feet to a depth of six inches into landscape area (unless contraindicated by a soil test);
3. Use plant material as follows:
 - a. For residential areas, install climate adapted plants that require occasional, little or no summer water (average WUCOLS plant factor 0.3) for 75 percent of the plant area, excluding edibles and areas using recycled water;
 - b. For non-residential areas, install climate adapted plants that require occasional, little or no summer water (average WUCOLS plant factor 0.3) for 100 percent of the plant area, excluding edibles and areas using recycled water;

4. Apply a minimum three-inch layer of mulch on all exposed soil surfaces of planting areas except in turf areas, areas receiving closely spaced plugs as a lawn alternative, or direct seeding applications where mulch is contraindicated.
5. Turf must comply with all of the following:
 - a. Turf shall not exceed 25 percent of the landscape area in residential and mixed-use areas with residential dwellings;
 - b. Turf is prohibited in non-residential areas;
 - c. Turf shall not be planted on sloped areas that exceed a slope of one foot vertical elevation change for every four feet of horizontal length; and
 - d. Turf is prohibited in parkways less than 10 feet wide, unless the parkway is adjacent to a parking strip and used to enter and exit vehicles. Any turf in parkways must be irrigated by sub-surface irrigation or by other technology that creates no overspray or runoff.
6. Irrigation systems must comply with all of the following:
 - a. Automatic irrigation controllers are required and must use evapotranspiration or soil moisture sensor data and utilize a rain sensor.
 - b. Irrigation controllers must be of a type that does not lose programming data in the event the primary power source is interrupted.
 - c. Pressure regulators must be installed on the irrigation system to ensure the dynamic pressure of the system is within the manufacturers recommended pressure range.
 - d. Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) must be installed as close as possible to the point of connection of the water supply.
 - e. All irrigation emission devices must meet the requirements set in the American National Standards Institute standard, American Society of Agricultural and Biological Engineers'/International Code Council's (ASABE/ICC) 802-2014 "Landscape Irrigation Sprinkler and Emitter Standard." All sprinkler heads installed in the landscape must document a distribution uniformity low quarter of 0.65 or higher using the protocol defined in ASABE/ICC 802-2014.
 - f. Areas less than 10 feet in width in any direction must be irrigated with subsurface irrigation or other means that produces no runoff or overspray.
7. For non-residential projects with landscape areas of 1,000 square feet or more, a private submeter(s) to measure landscape water use shall be installed.
8. At the time of final inspection, the applicant must provide the owner of the property with a certificate of completion, certificate of installation, irrigation schedule, and a schedule of landscape and irrigation maintenance.

15.04.613.070 Certificate of Completion

A Certificate of Completion, in the form specified by the Zoning Administrator⁵, must be submitted to the Zoning Administrator upon completion of the installation.

A. The Certificate of Completion must include the following six elements:

1. Project information sheet that contains:

CITY OF RICHMOND URBAN GREENING MASTER PLAN

- a. Date;
 - b. Project name;
 - c. Project applicant name, telephone, and mailing address;
 - d. Project address and location; and
 - e. Property owner name, telephone, and mailing address;
2. A Landscape Installation Certification of Completion that includes certification by a landscape professional that the project was installed per the approved Landscape Documentation Package. Where there have been significant changes made in the field during construction, "as-built" or record drawings must be included with the Certificate;
 3. Irrigation scheduling parameters used to set the controller;
 4. Landscape and irrigation maintenance schedule;
 5. Irrigation Audit Report; and
 6. Soil Management report, if not submitted with Landscape Documentation Package, and documentation verifying implementation of soil report recommendations.
- B. The project applicant must submit the signed Certificate of Completion to the Zoning Administrator for review; and ensure that copies of the approved Certificate of Completion are submitted to the local water purveyor and to the property owner or his or her designee.
- C. The Zoning Administrator will approve or deny the Certificate of Completion within ten days of receipt. If the Certificate of Completion is denied, the Zoning Administrator must provide information to the project applicant regarding deficiencies noted and appeal procedures.

15.04.613.080 Post-Installation Irrigation Scheduling

For the efficient use of water, all irrigation schedules must be developed, managed, and evaluated to utilize the minimum amount of water required to maintain plant health. Irrigation schedules must meet the following criteria:

- A. Irrigation scheduling must be regulated by automatic irrigation controllers.
- B. Overhead irrigation must be scheduled between 8:00 p.m. and 10:00 a.m. unless weather conditions prevent it. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance or if required by the water purveyor.
- C. Attention must be paid to irrigation run times, emission device, flow rate, and current reference evapotranspiration, so that the applied water meets the Estimated Total Water Use (ETWU). Total annual applied water must be less than or equal to the Maximum Applied Water Allowance (MAWA).
- D. Parameters used to set the automatic irrigation controller must be developed and submitted with the Certificate of Completion for each of the following:
 1. The plant establishment period;
 2. The established landscape; and

⁵ The State's Model Water-efficient Landscape Ordinance includes a sample certificate.

3. Temporarily irrigated areas.
- E. A diagram of the irrigation plan showing hydrozones must be kept with the irrigation controller.

15.04.613.090 Maintenance and Irrigation Audit Reporting

A. Landscape and Irrigation Maintenance.

1. A regular maintenance schedule must be submitted with the Certificate of Completion. This schedule must address routine inspections; auditing, adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; topdressing with compost, replenishing mulch; fertilizing; pruning; weeding in all landscape areas, and removing obstructions to emission devices.
2. Repair of all irrigation equipment must be done with the originally installed components or their equivalents or with components with greater efficiency.

B. Irrigation Audit Report.

1. After completion of the installation, a landscape irrigation audit must be conducted by a City landscape irrigation auditor or a third party certified landscape irrigation auditor and submitted with the Certificate of Completion.
2. Landscape audits shall not be conducted by the person who designed the landscape or installed the landscape.
3. In large projects or projects with multiple landscape installations, an auditing rate of one in seven lots or approximately 15 percent will satisfy this requirement.
4. The irrigation audit report may include, but is not limited to: inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule, including configuring irrigation controllers with application rate, soil types, plant factors, slope, exposure, and any other factors necessary for accurate programming.

